EDUCATIONAL TECHNOLOGY ADOPTION IN LEADING GHANAIAN STATE UNIVERSITY BUSINESS SCHOOLS

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Abstract

Today, the rapid growth of the use of technology in education has substantially increased the focus and relevance of educational technology research. This study addresses the question of whether technology can provide significant support in teaching and learning approaches and the associated issue of the elements needed for an effective implementation of technology within an educational reform context. Mixed methodological approach was adopted. Observations, interviews and questionnaires administration were the main form of data collection techniques employed by the researcher. Participants for the study were selected by purposive random sampling, which includes 20 teachers from business schools from four case study universities in Ghana together with 396 students. The study also took into consideration other stakeholders in the higher educational setting by interviewing 5 educational/learning technologists from the United Kingdom. The findings from the study suggest that most students and teachers do not use some form of educational technology due to the absence of these technologies and the poor training arrangement given by university authorities. Poor attitude was also seen to be an important factor for accepting and incorporating technologies in teaching and learning. The research provides an indication that information technology supports virtually every aspect of higher education, including research and *e*-learning which improves digital literacy of students and sustainability, and educators need to understand the range of problems their students face so they apply IT where it brings greatest value. The study also demonstrate that creating this IT support environment will require collaboration across organizational and national boundaries, bringing together the collective intelligence of people from backgrounds including education, corporations, and government.

Keywords:

Education, Learning, ICT, Educational technology, Higher Education, Leadership

Dedication

This thesis is dedicated to my Father His Royal Majesty King (Prof.) Noble Odaifio Welentsi III, Paramount Chief and President of the Nungua Traditional Council in the Greater Accra region of the Republic of Ghana for his support, advice and encouragement.

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I do hereby express my profound gratitude and appreciation to the Almighty God for his guidance and protection during my postgraduate research program in the course of acquiring this academic knowledge.

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Finally, I wish to extend my special gratitude to all the authors whose works were used for this study. They have been of great importance to me for this work.

Declaration

This is to certify that this thesis is the results of my own work, and that no portion of the work contained therein has been submitted for another degree or qualification in this or any other institution for a higher degree. To the best of my knowledge, it includes no material that has been published, and the original work is my own except where the due references are made.

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Glossary of Terms and Abbreviations/Acronyms

ICT	Information and Communication Technology
KNUST	Kwame Nkrumah University of Science and Technology
UCC	University of Cape Coast
UG	University of Ghana
UPS	University of Professional Studies
UNESCO	United Nations Educational, Scientific and Cultural Organization
AECT	Association of Education and Communication Technology
EduTech	Educational Technology
CD-ROM	Compact Disc-Read Only Memory
DVD	Digital Video Disc
ACOT	Apple Classroom of Tomorrow
CEO	Chief Executive Officer
OTA	Office of Technology Assessment
ISD	Instructional System Design
MKO	More Knowledgeable One
SPSS	Statistical Program for Social Scientist
UNICEF	United Nations International Children's Emergency Fund
UNDP	United Nation Development Program
BECE	Basic Education Certificate Examination
JHS	Junior High School
WASSCE	West African Secondary School Certificate Examination
H.E	Higher Education
MoE	Ministry of Education

Chapter 1- General Introduction

This research investigation seeks to explore the adoption of educational technologies in the Ghanaian education sector. The purpose of this chapter is to presents the background of the study that informs the research and the potential findings. Also, the rationale of the study, aims and objective of the research, research questions as well as the researcher's motivation for the study is provided. The organization of chapters that was employed in the study has been given. In short, this chapter summarizes exactly what was done in the time available to the researcher.

1.1 Background

The impact of educational technology has been met with much scepticism in recent years due to lack of evidence that it has been an effective tool in improving students learning and its perceived excessive cost (Cuban, 2001). The concern regarding students and teachers preparation for effective utilization of educational technology was reinforced by Cuban (1993), who posited that the technological revolution in universities has been typically limited to small cadre of determined users while the majority of students and teachers in developing countries remained casual or nonusers of the available technologies. Cuban also proposed that teachers lack the access, skills and knowledge necessary to properly utilize such technologies effectively in classrooms. The preparedness for teachers and students to use educational technology was additionally addressed by Ivers (2002), who found out although teachers rated themselves as intermediate users; they have not felt confident in using educational technology as a tool for their teaching deliveries.

As universities in Ghana have continued to embrace and expand their use of educational technology, students and teachers have often grappled with the lack of training in how best to integrate these technologies into their pedagogical practices (Moursund & Bielefeldt, 1999), while acknowledging that the use of educational technology has provided students 'considerable motivation to work and engage in learning' (Lockwood,

1998, p. 12). Ivers (2002) has pointed that there should be a movement towards a more constructivist-oriented teaching and learning which could incorporate technology in more powerful ways. This has been observed to result in students who are 'more active, autonomous and highly engaged' (Tammets *et al*., 2000, p. 34) as learners of all ages interact with others at the intersection of educational technology and pedagogical practice (Twidle *et al*., 2006).

As a developing country, Ghana relies heavily on the skilled labor of the country and to ensure economic stability it has become very important to empower individuals at the higher educational level with the needed skills and attitude which are vital for the progress of the economy, hence the addition of technologies into the higher educational system is a determinant factor for the overall growth of the country (Pourtashi & Rezvanfar, 2010). Zlamanski & Ciccarelli (2012) argue that for technologies to effectively support university education there must be the needed infrastructure to enable the smooth functioning of technologies. Infrastructural development therefore becomes the backbone of technology usage; hence if universities in Ghana are to enforce human resource development there is the need to include technologies in teaching and learning. This would keep the country at par with the best practices of other universities in the developed countries who sustained relationship with hi-tech industries with successful results in breakthrough of the Internet age like Google and Facebook who were students of American universities. Knowledge and Information sharing are heavily aided by extensive technology usage and has become the driving force of a modern economy: the perfect way every information and knowledge is shared and created could lead to a more competitive advantage for universities (Nkansah & Unwin, 2010). Alternatively, if the information and knowledge created and shared are not managed effectively, it can lead to low productivity.

The reason for this research investigation is to better understand how educational technology has either facilitated or hindered the approaches that university educators are using within their everyday practices. The functional intent of this research is to investigate current learning and teaching practices and teachers' perceptions of technology in order to determine the inherent value of this push for technology in the

classroom. The larger goal is to find a reasonable compromise between these educational technologies and traditional teaching practices. If educators can develop a reliable means of teaching within the university system using these technologies, this may help assuage some of the social problems that now exist with student's use of technology in the higher educational system. This could also potentially result in finding new ways to incorporate these forms of technology and media into the larger society.

In light of these varying perspectives, there is a need to emphasize the role of research-based evidence of the use of educational technology; such evidence will serve to guide future practice as well as future pedagogical and technological resource decisions.

1.2 Rationale of study

Educational systems in both the developing and developed nations are embarking on vital tasks to streamline their teaching and learning activities with the use of technologies to meet the development requirement in the 21st century (Reigeluth *et al*, 2012). Higher education in this 21st century is expected to produce competent workforce who can compete and succeed in a speedily changing environment to peacefully improve their respective countries (Rempel, 2015). However, researchers such as Selwyn (2014) and Oliver & Conole (2007) argue that educational technologies have not fully brought about its range of gains expected from the scale of investment, which have been committed. On the other hand, Wideen *et al*., (1998), have strongly expressed that educational technologies can bring about immense educational benefits Key difference, between these apparently contrasting findings, identified by the latter authors, concerns approaches and roles of teachers, tutors, counsellors, policy makers, or parents supporting educational practices.

The Ghanaian government is planning the use of ICT as a major contributor in the country's economic development (Amekuedee, 2002). The Education Strategic Plan 2003-2015 and Ghana Poverty Reduction Strategy Paper pointed out that ICT is a way of drawing out to the poor in the country. In 2004, the cabinet approved the National ICT for Accelerated Development (ICT4AD) Policy to improve the socioeconomic

development, information society, and cultural well-being; through the accelerated development and infrastructure modernization of the economy and society (Harron, 2009). The Government is using ICT as the main engine for accelerated and sustainable economic and social development. The main objective of the ICT4AD policy is to transform Ghana into a middle income, information-rich, knowledge based and technology-drive high-income economy and society. One of the significant parts of the ICT4AD policy is the incorporation of ICT at all levels of education.

The inclusion of technologies at Higher Education Level was aimed at the acquisition of basic ICT literacy, developing, interest and use technologies for learning in other subjects, acquisition of knowledge for application of technologies in education and business, the use of the Internet to communicate effectively and the ability to follow basic ethics in the use of technologies (Bartlett, 2002). It is therefore expected that the knowledge and skills gained will help students to use ICT in almost all their courses at school and to access information for further learning. In spite of the benefits gained in using technologies in schools with all these policy objectives in place, very little in ICT has been achieved in Ghanaian Higher education (Amekuedee, 2003). There are numerous challenges, which continue to affect effective implementation of ICT in Higher education. Owing to the importance of ICT to national development and the future of education, it is very prudent to identify the challenges undermining the use of ICT in High educational sector in Ghana

To succeed, ICT-related educational programs should be designed, adopted and implemented by government and third party organizations to accommodate a number of recognized achievable educational objectives. Importantly, technology continues to change rapidly and is often repurposed, and time is needed to implement and recognize agreed outcome benefits.

This research investigation would therefore provide the concerns about educational technology usage in Ghanaian university and would feed the stakeholders in the Ghanaian educational system with the required steps necessary and sufficient for effective utilization of educational technologies in universities in Ghana. This study is intended as a research piece that would capture current international experience in

technology use in education. It would also be useful in orientation and training programs aimed at educational and governmental leaders concerned with the effective use of technology in education.

1.3 Research Motivation

The researcher's role as an undergraduate student for four years at the Kwame Nkrumah University of Science and Technology (KNUST) in the Republic of Ghana led to an observation and gathered insights into the actual gaps existing in the educational technology management in universities in Ghana. Examples of some major observations are concerned with the poor management of educational technology by tutors during classroom teaching deliveries resulting in delays in teaching and learning. The researcher also observed some variations in teaching approaches by tutors in the classroom where some tutors took the initiative to identify a variety of educational technologies and teaching materials for their lessons, whiles for others, the white board were the only materials used. The researcher always wondered why that difference.

Another concern is related to student's use of technological tools to aid their learning activities. From personal observation, most students prefer the traditional way of learning and doing assignment to using educational technology tools. However, studying for the researcher's postgraduate course at the University of Salford presented the opportunity for frequent use of educational technologies, which aided and significantly improved the researcher's knowledge base. As a way of helping to eradicate the dilemma of technology usage among tutors and students in Ghana, the researcher has an unflinching commitment that motivated to explore the overall usage of educational technology, which would highlights, some areas of concerns with regards to the policies that needs to be put in place and the learning environment conducive for the adoption of educational technologies in Ghanaian universities. Therefore the research results and commendations would be reported to educational policy makers, tutors, students, administrators and curriculum development specialists concerned with how technology can be used to extend access and raise the quality of education in Ghana.

1.4 Objectives of study

This research study aims to explore the adoption of educational technology in the university classroom in Ghana. The research perspective was on how the use of educational technology appears from students and tutors perspective. Based on preliminary literature review and the study's aim, the following objectives were identified and were strictly followed in order to achieve the desirable result. The research objectives were mapped to achieve particular research questions in chapter 5 (Research methodology)

1. To conduct a comprehensive literature review on EduTech to understand its main concepts and identifying the gaps
2. To identify benefits and risks associated with the use of EduTech by interviewing teachers and learning technologist; and administering questionnaire to students
3. To explore factors that aids in the implementation and use of ICT into classroom curriculum by interviewing teachers and learning technologist; and administering questionnaire to students
4. To develop a conceptual framework from the strand of literature for the possible factors that helps in successful implementation and use of EduTech in H.E
5. To identify various forms of EduTech employed by teachers and students in Ghanaian H.E system by interviewing teachers and administering questionnaire to students
6. To suggest possible recommendation for effective implementation and use of ICT in education based on the research findings and conclusion.

1.5 Overview of the Research Questions

The researcher under this investigation developed the following research questions based on the aims and objectives and the vast literature search conducted. However, the actual process that was employed for the formulation of these research questions has been discussed in chapter 5 of this thesis.

1. What are educational technologies (EduTech)?

2. What kinds of EduTech do universities in Ghana mostly use?
3. What reasons did teachers and students have for using or not using educational technologies in teaching deliveries?
4. What consequences exist in using educational technologies in Higher Education?
5. What favourable conditions are required for effective use/integration of educational technologies in classroom activities?
6. To what extent has the use of Educational technologies benefited teachers and students?

1.6 Research Contributions

This study should be original piece of work, as such the researcher under this investigation demonstrated that this research topic has not been studied before, or if done, this investigation is using a different perspective. In other words it should provide a significant contribution to knowledge. This was reflected by Petre & Rugg (2010, p. 34), '*making a significant contribution means adding to knowledge to contributing to the discourse- that is, providing evidence to substantiate a conclusion that's worth making*'.
The findings from this research investigation demonstrate methodological, theory and practical contributions to the study of Educational technology in Higher Education in Ghana. These expected contributions have been highlighted below and a more detailed version can be found at chapter 8 of this study.

- **Knowledge/Methodological contribution**

By reviewing empirical studies on educational technology, the researcher has added a great significance to existing body of knowledge by research methodological design adopted. Prior research conducted in Ghana by Sarfo and Ansong-Gyimah (2010) indicates that tutors and students were the two main important stakeholders in the higher education that were considered, however, this study's contribution has been extended to add learning technologist to fully share their respective opinion with regards to educational technology. Even though the study employed the mixed method approach, qualitative approach was heavily relied upon and data collected was through interviews

and questionnaires. The interview conducted allowed for an in-depth study, which allowed for effective comparison between ideas in order to underpin the use of educational technology in Ghanaian universities

Another methodological contribution is the case study for this research investigation. Other researches such as Mereku *et al*., (2009) in their study on pedagogical Integration of ICT used only one University in Ghana (University of Education, Winneba) and four senior high Schools to arrive at their finding. This research study has selected four universities in Ghana, which could provide effective and new findings, different from Mereku *et al*., (2009) and offers an additional knowledge with respect to educational technology in Higher Education in Ghana.

- **Theoretical contribution**

The research provided an extensive knowledge on the factors that are needed in implementing an educational technology into any classroom curriculum in developing countries. It looked at the external and internal factors in any developing countries that are most needed for any ICT implementation in higher education. A more detailed explanation is offered in chapter 3 of this thesis under the conceptual framework models. The findings of the study also brought about some important variable that needs to be considered within the internal environment of the university in the developing countries for the effective integration of ICT into classroom activities. Details of this model are extensively presented in section 7.17 under chapter 7 of this thesis.

- **Practical contribution**

The findings of this research investigation helped to identify the higher order of educational technologies been available and incorporated into teaching and learning in universities in Ghana. List of higher order of technologies been used by teachers and students are presented in more detailed in section 8.5 under chapter 8 of this thesis. This research also explored the reasons for teachers and lecturers reluctance in using technologies in their respective teaching and learning. Given the context of this study, it

provides suggestions for authorities in Ghanaian's Higher Learning Institutions to manage knowledge about educational technology and accordingly maximize their usage.

Other contributions of this study as follows:

- This research investigation contributes to the literature debate on the theoretical framework of educational technology, its universal application and its overall effect on teaching and learning.
- Having reviewed vast literature on educational technology, this study therefore presents an original and pioneering research carried out in Ghana. The findings would therefore help to rich existing literature on educational technology usage in Ghana, and would fill the gap identified in educational technology in the Ghanaian context particularly.

1.7 Dissertation Structure

This research study involves systematic procedures and designs for it realization, hence, the following presentation shows how this research investigation under study has been arranged:

Chapter 1.0 – General Introduction

This chapter introduces exactly what will be done in the time available to the researcher under this investigation. It introduces the concept of technologies and educational technologies with some fundamental definitions. The researcher has identified some gaps in the major academic literature that leads to the design and development of rationale of the present study and research questions. This research questions leads us to the actual steps needed to the development of our aims and objectives. Furthermore, the research contributions are discussed. Finally, outline of chapters employed for this research will be presented to show how the study progresses to the end.

Chapter 2.0 –Literature Review

This chapter reviews and explores previous studies and the available literature with respect to educational technologies on an international scale. It informs the researcher about works that has already been done on the topic area. This chapter systematically links to the research's aims and objectives in order to achieve our research questions. It looks at the definition of technology and educational technology in more details as well as strategies that contribute to technology program's success in the classroom. It also looked at some challenges to the implementation of ICT in the classroom as well as some pedagogical theories and its implication on technology. In nutshell, it explores the real practices and activities that surround educational technologies, the overall meaning that users attach to these tools and the social relations and structure that these technological devices are basically linked to.

Chapter 3.0 – Conceptual Framework

This chapter provides the overview of some concepts that have been highlighted to be the main factors needed for effective implementation of EduTech in higher educational system. It looks into the internal and external approach. Factors regarding the internal factors are measure within universities that aids the implementation of EduTech such as the university leadership (which takes into considerations the training and development and the provision of resources) and teachers and students attitude towards new technologies. The external factors that were considered are the government policies, industry-university relationship, technology advancement and demand for access to higher education.

Chapter 4.0 – Research Context (Ghana) and Case study Profiles

This chapter gives the introduction to the Country where the case study for this study would be selected. It consists of several sections that would help to give the overview of Ghana and its educational system. To start with, the country profile is given followed by the history of Ghana educational system and its reforms. The third section illustrates the current educational system of Ghana and its ICT policies. Furtherance to this chapter, the

profiles of the individual case studies universities are presented namely, University of Ghana (UG), Kwame Nkrumah University of Science and Technology (KNUST), University of Professional studies (UPS) and University of Cape coast (UCC).

Chapter 5.0 – Research Methodological design

This chapter describes the research methodological path that was employed for this research investigation. It considers the views of several scholars about the path to research methodology for any research investigation, followed by justification for the selection of the most suitable and appropriate methodological path. It considers issues of research philosophies and epistemologies that lead to describe the perceptions and assumptions of the researcher that influence his view of the world. It further explores the data collection techniques employed for this research, and finally, provides insight into the related research validity and reliability as well as how the research ethics for this investigation were observed.

Chapter 6.0 – Pilot study investigation

This chapter explains the pilot investigation that was conducted, including stages of design, development, administration and analysis of results. A design reflection of the outcome of the pilot study was discussed in order to assist in the formulation of the main survey investigation.

Chapter 7.0 – Survey Investigation

This chapter presents the final administration of the main survey that was conducted among the 4 individual case universities. The survey questions were analysed, interpreted and presented in a more systematic way to provide a true meaning to our research. Findings from each four universities were presented followed by summary of findings.

Chapter 8.0 – Interview Investigation

This chapter describes the outcome of the interview conducted among teachers from the four case study universities as well as learning/educational technologists from the UK. Findings were evaluated using the ranking order of the interviewee's questions.

Chapter 9.0 – Discussion of Findings

This chapter highlights the overall summary of the survey and interview investigation conducted. The major outcomes of the research investigation are presented as well as correlation of findings to the literature review conducted in chapter two of this study.

Chapter 10.0 – Conclusion and Recommendations

This chapter examines and concludes from the overall results of the two strands of data collection methods (Interview and questionnaire). Conclusions are presented for each of the study's research questions, showing how it has all been achieved, and finally, contributions to the field and potential future works will be explored.

1.7 Chapter Conclusion

This presented chapter highlighted a background review on educational technologies that greatly informed this research investigation. The researcher has stated the research questions, which will inform the study and added the objectives necessary and sufficient for the realization of this piece of research investigation.

The researcher has also given the rationale for this investigation and the methodological approach that would be employed has also been highlighted briefly. This research investigation explored educational technologies from an international scale to bring out different experiences and adopted multiple case studies in the Ghanaian educational sector by selecting four universities. The overall structure of the research has been given by stating the brief content of the seven chapters. The next chapter will present a well detailed review of literature on educational technologies in align with the study's objectives.

Chapter 2.0: Literature Review

Having identified the research topic for this investigation, this section aims to review a comprehensive body of literature on the role of educational technology for teaching and learning. According to Gill and Johnson (2010, p.87), 'a literature review is a critical evaluation of the existing body of knowledge on a topic, which guides the researcher and demonstrates that relevant literature has been located and analysed. It should incorporates the latest literature and cover the major questions and issues in the field of study'. This definition concur with the views of Hart (2014, p. 13) who also asserted that 'literature review is the selection of available documents (both published and unpublished) on the topic, which contain information, ideas, data and evidence written from a particular standpoint to fulfil certain aims or express certain views on the nature of the topic and how it is to be investigated, and the effective evaluation of these documents in relation to the research being proposed'.

This chapter would therefore help the researcher to avoid unnecessary duplication of ideas about education technology; rather write to fill the gap. Since educational technology is a growing field in developing countries, there is severe limitation in the literature addressing methods and links needed for implementing this concept in developing countries. Therefore, the researcher under this investigation carefully reviewed the literature in the educational technology domain to identify the main theoretical dimensions and the importance of educational technology in the higher education.

The researcher carefully formulated research questions, which the study seeks to answer and these questions were mapped to the objective of the study to show a link to the study's aim. These research questions guided the researcher to determine the scope of the literature review that was conducted. The literature review that was conducted therefore consists of various views and ideas about the research questions. Key Publications on educational technologies and pedagogical practices have been included in the body of the thesis and the list of these indicative references could be found at Appendix K. Table 5.2 under chapter 5 shows the study's research questions and its association with the objectives for the study.

2.1 Introduction

The topic under investigation captures the attention of education and technology; therefore a number of definitions have been presented to properly understand the concept of education and technology before moving on to give several views on the concept of '*educational technology*'. Furtherance to the review, benefits of using technologies for teaching and learning have been presented, followed by technology's effect on students' achievement and strategies that allows for effective educational technology success. The third section would layout some implementation challenges in incorporating ICT into classroom activities in the higher educational sector. The fourth section would also clearly explain some the pedagogical theories and the use of technologies and its implication. The last section would explore some gaps and biases in the literature relating to educational technology in the higher educational sector.

It is very important to mention at this stage that, this research investigation would bring out some educational technologies being utilized by learners and educators in educational settings across the globe, however, it is not the primary focus of this research investigation to lay much emphasis to these technological tools and its applications, but would focus on real practices and activities that surrounds them, the overall meaning that users attach to these tools and the social relations and structure that these technological devices are basically linked to.

2.2 Definition of concepts

As stated above, the topic area draws the attention of education and technology, hence, much time is needed to give detail review of these terminologies. This section would provide detail review of the concept of educational technology.

2.2.1 Education verses Learning

There is much argument concerning the terms "education" and "learning" and this has resulted in cases where they are often used interchangeably (Selwyn, 2014). In other words, "education" and "learning" seem to be used as synonyms in many instances. One

would hear phrases like “Higher Education Institution” for universities and “learning Centres” for places in those institutions where people are usually or supposedly involved in acquiring a particular or required knowledge, or one would hear sentences like “ You go to school to learn”. However, the literature confirms that there are some differences between the two words and these are highlighted below. The following examined the issue in depth by outlining some traditional definitions of these terms and their implications for teachers and student’s development.

2.2.1.1 Etymological meaning of Education and its concept

From etymological perspective, the concept of “education” was originally derived from the Latin word ‘*educare*’ that connotes “to raise” and “to bring up” (National Centre for Educational Statistics, 2003). This notion seems to explain that education aims at nourishing the good qualities and making an individual a better person. Friedman *et al*., (2010) also added that education aims at developing an individual’s innate or the inner potentialities. Educationists such as Selwyn (2014) also asserts that ‘education’ was derived from the Latin term ‘*Educatum*’, which historically means the act of imparting knowledge or training an individual. The meanings of these root words lead us to believe that education aims to provide a nourishing environment that would facilitate or bring out and develop the potentialities in an individual. The Manpower Service Commission (1981) on the other hand also explained that education is a more general, less specialized or hands-on to enhancing knowledge. The commission defined education as “*Activities which aim at developing the knowledge, skills, moral values and understanding required in all aspects of life rather than knowledge and skill relating to only a limited field of activity* ” (p. 17).

In order to fully understand the whole meaning of education, the researcher has provided in the next section the narrow and broader definition of education.

2.2.1.2 Narrow meaning of education

In a narrow sense, the aim of education is measured in terms of degrees or certifications or promotion- this basically shows a deliberate attempts or efforts made with a definite purpose to develop certain amount of knowledge, skills, attitude and habits in higher

institutions (Levy & Murnane, 2007). This position constitute the narrow view on the concept of education; which is confined only to a few specific, deliberate, and planned efforts that have a bearing on the development of the individual. Thus in a narrow sense, the educator aims at producing the literate or a professional person. This, was reflected by Willingham (2007, p. 45), stating that:

> "*Education in the narrow sense does not include self-culture and the general influences of one's surroundings, but only those special influences which are consciously and designedly brought to bear upon the youngster by the adult persons of the community whether through the family, the church or the state*".

From the above views on the narrow definition of education, *education* is therefore nothing, but a purposeful activity, which is deliberately planned for the optimum development of an individual's potentials.

2.2.1.3 Broader meaning of education

From a broader perspective, education is not only limited to classroom or planned activity as depicted in the narrow perspective. Selwyn (2014) argues that it is a lifelong process, which aids individuals to acquire lots of experiences, knowledge, and skills from different stages of life; though could be formal, informal or incidentally. From the broader view, education is an act of experience, which could have a formative or addictive influence on an individual's personality (Allison and Hood, 2017). Under this ideology, education is a lifelong process that includes all experiences that the child receives in the school or at home, in the community and society through interactions of various sorts and activities. Lynch and Lodge (2002, p. 23) also asserted,

> "*Whatever broadens our horizon, deepens our insight, refines our reactions, and stimulates our thoughts and feelings educates us*".

Thus the broader meaning of education implies the process of development, wherein the individual gradually adapts himself/herself to various ways to his/her physical, social and spiritual environments.

With the above explanation in mind, the processes and practices of what could be understood as 'education' is obviously related to Roger's 'learning-conscious' or 'formalized' descriptions of learning (Vygotsky, 1988, cited in Pritchard, 2014). From the '*layman's'* perspective, 'education' refers to the institutionalized sponsored provision of formalized learning (Selwyn, 2014) - that is, learning that is structured and often assessed and credentialed (Mills, 2000). According to Kassem & Garrett (2009) and Bates & Lewis (2012) '*formal education'* is perhaps the easiest form of education to identify and by far the most discussed in the academic literature. A wide range of institutionally provided educational opportunists exist- most obviously the compulsory forms of school-based learning for children and young people. Similar forms of post-compulsory education also exist in the shape of colleges, universities and different types of distance education. Formal education can also be found outside of settings such as the school and the university. For instance adult education institutions offer a range of full time and part time opportunities on face-to-face of distance basis.

2.2.1.4 Education as a process and product

There is always a controversy whether education is a process or a product (Selwyn, 2014; UNESCO, 2012). Mostly, we consider education as a product, that is, something that has been produced as a result of certain inputs, which in this case is instruction or experiences (Pritchard, 2014). In this sense, it is the sum total of what is received through learning — the knowledge, skills, values that are the outcomes of learning. The concept of education as acquisition of knowledge was prevalent since the beginning of history of education (UNESCO, 2012). Many literature sources and the religious doctrines have propounded that 'knowledge is power' and 'knowledge is virtue'. Even now it is believed that knowledge leads to wisdom. Education becomes a product only when it assimilates the culture of any society, and is transmitted from one generation to another. Education fosters values in people, which are universally accepted as valuable at a given point of time (Pritchard, 2014). Transmission of knowledge or skills, which takes place as a purposeful activity in a variety of ways, could be termed as the product of education.

Education can also be referred to as a process. In this sense, education is referred to the act of developing the intellect, critical thinking abilities, social and cultural understanding,

and understanding of one's own self. Education is considered as an active and a dynamic process, which takes place continuously during one's life by way of various experiences through either in a formal or in an informal manner (UNESCO, 2012). The individual continuously learns. In this process, he or she learns to utilize one's experiences in learning new things and also to reconstruct new things in the place of old ones. Thus the learning takes place throughout life, which is an active and a dynamic process. This dynamic process is nothing but education. So, it can be said that education is a product as well as a process.

To educate is, in short, to set out to create and sustain informed, hopeful and respectful environments where learning can flourish (UNESCO, 2012). It is concerned not just with knowing about things, but also with changing the world we live in (Benneth and Benneth, 2003). As such education is a deeply practical activity – something that we can do for ourselves (what we could call self-education), and with others (Oates, 2014). This is a process carried out by parents and careers, friends and colleagues, and specialist educators by the use of desktop computers and standardized tests among them, which will soon become obsolete.

2.2.2 Learning

There have been several definitions of learning given by different researchers due to their own philosophical positions. Pritchard (2014) also concur by asserting that learning is an integral part of education; however, many educational researchers are most often seen to give various definitions of learning, which are inconsistence due to ideological differences. The purpose of this section is to point out some key elements of learning which have some individual and social implications for teachers.

Jensen (2001) argues that learning should be considered in a more holistic manner as process that constitutes training as well as education. According to Selwyn, (2014, p. 34), learning can be described as 'a self-directed, work-based process leading to increased adaptive capacity.' This process is a lifelong journey that may not always be clearly planned or even intentional—can be considered the heart of human resource development

(Garavan *et al*., 1999). As Mumford (1995, p. 13) observes, this process includes the acquisition of skills as well as insights or factual knowledge, and is at play whenever:

> "*People can demonstrate that they know something that they did not know before (insights and realizations as well as facts) and/or when they do something they could not do before (skills)".*

Whiles Hodkinson and Macleod (2010, p. 174) gave his definition of learning as "*Learning is a conceptual and linguistic construction that is widely used in many societies and cultures, but with very different meanings, which are fiercely contested and partly contradictory. Learning does not have a clear physical or reified identity in the world"*

Mayer (2009, p. 34) also stated "*learning is a change in knowledge attributed to experience*". There are three main elements that noted from Mayer's definition- (a) learning is a change in the learner, (b) what is changed is the learner's knowledge, and (c) the cause of the change is the learner's experience in a learning environment.

On the other hand, Selwyn (2014, p. 3) also stated, *"Learning refers to an individual's acquisition of new skills, or else new form of knowledge and understanding*". This definition given by Selwyn also concurs with the Bloom's (1956) well-known ''*taxonomy of educational objective''*. Here Bloom explained in his analysis that all forms of learning could be illustrated over three main over-lapping domains: the psychomotor domain (manual and physical skills – that is, 'doing'); the Affective domain (emotions and attitudes- that is, 'feeling'); and the cognitive domain (intellectual capacity and knowledge- that is, 'thinking'). This is shown in figure 2.1 below.

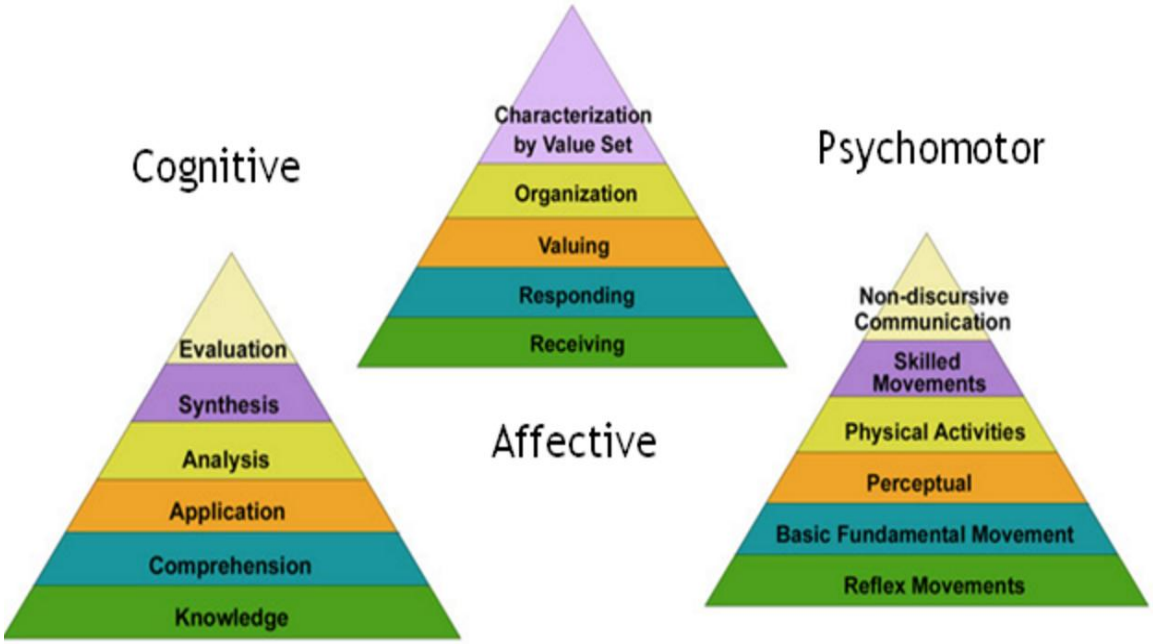


Figure 2.1: Bloom's taxonomy of educational objective (Bloom, 1956)

2.2.2.1Learning as a process and end product

One of the areas of argument among most researchers in education is whether the concept of learning should be viewed as a '*process*' or '*an end product*' (Selwyn, 2013). Most of the learning theories that were developed during the early days of the 20th centuries conceptualized learning as *an end product* or an *outcome* rather than a process (Selwyn, 2014) - most often as a distinct change in the learner's behavior (see section 2.9 for detailed explanations of learning theories).

This idea of learning is depicted, for example in the 'behaviorist' philosophy of learning to be somehow permanent changes in the entire behavior of the individual due to the experiences the individual has gone through (Ferster, 2014). This view of learning as an *end product* can be seen as very important way of understanding this concept especially among most learners themselves. Most students (learners) and educators also continue to view learning consisting largely of 'gaining knowledge' and 'the filling of empty holes'- ideas that was described by Berreiter (2002) as 'folk' theories of learning.

Other researchers in the field of education also believe that learning can most often be an unconscious and unplanned process that the individual is unaware is taking place. This is what Rogers (2003) referred to as a type of learning as ongoing process of 'task-conscious' or 'acquisition learning' that most often take place. Here Rogers (2003) explained that this type of learning is 'concrete, immediate and confined to a specific activity; it is not concerned with general principles'. For instance, there is much of learning that is involved in parenting or running a home and this could be said to best fit this description. While some educationist describes this type of learning as unconscious or implicit, Rogers (2003) explained that could be better to speak of people as having a consciousness of the task. This means that, while the individual learner may not actually be conscious of taking any learning act, they are usually aware of the specific task in hand.

The researcher has in the following presented that similarities and differences between education and learning for effective analysis.

2.2.2.2 Similarities and differences between Education and Learning

Education can be said to be a process through which a society passes on the knowledge, values and skills from one generation to another. Learning can be defined as the acquiring of new skills, knowledge, and values.

Both learning and education has a great influence on the mind and character of an individual. However, learning is the basic instinct possessed by all individuals, and, on the other hand, individuals acquire education.

Education is something that an individual gets from an outside source. On the other hand, learning is something that evolves in the inner self. Education is something that one gets from a school or university; education is related to classroom learning, and some other set standards. On the contrary, learning evolves at the personal level, for which there are no set standards. A tutor imparts education, whereas an individual learns from his surroundings.

Learning is knowledge gained through experience, and education is knowledge gained through teaching. Education could be described as well organized, whereas learning is something that is related to an individual's perception.

Education is the process of imparting knowledge, values, skills and attitudes, which can be beneficial to an individual. On the contrary, learning is the process of adopting knowledge, values, attitudes and skills.

2.2.2.3 Conclusion

While the concepts of education and learning can be difficult to disentangle, it is useful, from the researcher's perspective, to develop precise and separate definitions, in order to better understand the specific, concrete challenges and outcomes associated with each type of activity. Though their meanings are closely interrelated, it can be misleading to simply use these terms synonymously, as is often done. In the field of education, where the immense benefits of appropriate students and tutors education and learning are widely recognized, working towards more precise definitions can help to clarify the issues at stake, empowering individuals and educational institutions to achieve their objectives using the most appropriate strategies available.

The next section leads us to the area of technology, where its full meaning has been given to bring out what constitute technology.

2.2.3 Technology

The dynamic nature of technology has contributed to the existence of various definitions and concepts of technology by the previous studies. The discussion on the concept of technology is crucial in getting a clear understanding of the nature of technology and examining what the technology consists of. Past studies have shown that defining the concept of technology is not easy (Reddy and Zhoa, 1990); therefore technology has been defined from different perspectives. The term 'technology' is inherently abstract concept, which is difficult to interpret, observe and evaluate (Blomstrom and Kokko, 1998).

Regardless of the extensive research done on this subject, many of the literatures are fragmented along different specialties and generally there is no commonly accepted

paradigm (Reddy and Zhoa, 1990). Lan and Young (1996) stress that the technology definition is varied according to authors and context of disciplines. Because of this the concepts, variables and measures relevant to the study are different from one study to another (Kumar *et al.*, 1999). Therefore, the main objective of this section is to contribute to the existing literature by comprehensively reviewing the definitions and concepts of technology.

2.2.3.1 Literature Analysis on the definition and concept of Technology

Past researchers have viewed and defined the term 'technology' from many perspectives and this has influenced the research design and results, negotiations around a transfer and government policies in general (Reddy and Zhoa, 1990). Thus, the term technology has been given various definitions by previous literatures. According to Kumar *et al* (1999) technology consists of two primary components: 1) a physical component which comprises of items such as products, tooling, equipment's, blueprints, techniques, and processes; and 2) the informational component which consists of know-how in management, marketing, production, quality control, reliability, skilled labour and functional areas. The earlier definition given by Sahal (1981) views technology as 'configuration', observing that the transfer object (the technology) relies on a subjectively determined but specifiable set of processes and products.

By scrutinizing the above technology definition, there are two basic components that can be identified: 1) 'knowledge' or technique; and 2) 'doing things'. Technology is always connected with obtaining certain result, resolving certain problems, completing certain tasks using particular skills, employing knowledge and exploiting assets (Lan and Young, 1996). The concept of technology does not only relate to the technology that embodies in the product but it is also associated with the knowledge or information of it use, application and the process in developing the product (Lovell, 1998; Bozeman, 2000).

The early concept of technology as information holds that the technology is generally applicable and easy to reproduce and reuse (Arrow, 1962). However, Reddy and Zhoa (1990) contend that the early concept of technology contradicts with a strand of literatures on international technology transfer, which holds that "technology is

conceived as firm-specific information concerning the characteristics and performance properties of the production process and product design". They further argue that the production process or operation technology is embodied in the equipment or the means to produce a defined product. On the other hand, the product design or product technology is that which is manifested in the finished product.

Pavitt (1985) suggests that technology is mainly differentiated knowledge about specific application, tacit, often un-codified and largely cumulative within firms. Thus, based on this argument, technology is regarded as the firm's 'intangible assets' or 'firm-specific' which forms the basis of a firm's competitiveness and will generally release under special condition (Dunning, 1981). Tihanyi and Roath (2002) propose that technology can include information that is not easily reproducible and transferable. Based on this argument technology is seen as "tacit knowledge (Polanyi, 1967) or firm-specific, secrets or knowledge known by one organization" (Nonaka, 1994).

Technology as the intangible assets of the firm is rooted in the firms routines and is not easy to transfer due to the gradual learning process and higher cost associated with transferring tacit knowledge (Rodasevic, 1999). Valuable technological knowledge, which is the intangible assets of the firm, is never easily transferred from one firm to another because the technological learning process is needed to assimilate and internalized the transferred technology (Lin, 2003). Rosenberg and Frischtak (1985) also consider technology as firm-specific information concerning the characteristics and performance properties of production processes and product designs; therefore technology is tacit and cumulative in nature. Burgelman *et al* (1996) refer technology as the theoretical and practical knowledge, skills, and artefacts that can be used to develop products and services as well as their production and delivery systems.

Technology is also embodied in people, materials, cognitive and physical processes, facilities, machines and tools (Lin, 2003). Based on Sahal's (1981) concept, Bozeman (2000) argues that technology and knowledge are inseparable simply because when a technological product is transferred or diffused, the knowledge upon which its composition is based is also diffused. The physical entity cannot be put to use without the

existence of knowledge base, which is inherent and not ancillary.

MacKenzie and Wajcman (1985) define technology as the integration of the physical objects or artefacts, the process of making the objects and the meaning associated with the physical objects. These elements are not distinctive and separable factors but form a 'seamless web' that constitutes technology (Woolgar, 1987). In defining the term technology, all the three elements must be understood as being inter-connected to each other and a change in one element will affect the other two elements. The latest definition given by Mascus (2003) has broadened the concept of technology where technology is defined as 'the information necessary to achieve a certain production outcome from a particular means of combining or processing selected inputs which include production processes, intra-firm organizational structures, management techniques, and means of finance, marketing methods or any of its combination'.

Other scholars such as Tepstra and David (1985) suggest that technology as a cultural system concerned with the relationships between humans and their environment. From the systems perspective Afriyie (1988) defines technology as encompassing: 1) the basic knowledge sub-system; 2) the technical support system (software); and 3) the capital-embodied technology (hardware). This perspective views that technology recognizes the need to identify the different elements of a particular country's technology that are complementary and mutually reinforcing. The previous studies done by the researchers have offered various definitions and concepts of technology from different disciplines, contexts and perspectives. Table 2.1 below shows a list of definitions and concepts of technology (in a chronological order), which was gathered from the previous literatures.

Apart from understanding the concept of technology, the classification of technology is also crucial in explaining the various kinds of technologies that embody in the product, production processes and human capital of the firm. Reddy and Zhoa (1990) in their extensive review of technology transfer literature have constructed taxonomies of technology from the previous literatures. Mansfield (1975) was the pioneer in developing the early taxonomy of technology to mean 'embodied' and disembodied in technology classification. The classification was later further extended by Madeuf (1984) to include

capital embodied, human embodied and disembodied technology. Hall and Johnson (1970) suggest the use of "product-embodied", "process-embodied" and "person-embodied" technology classification rather than the classification based on "general", "system-specific", and "company specific" technology.

General technology includes technical information, which is common to companies in the same activity. System specific technology corresponds to knowledge and know-how develops for solving particular industrial problems. Company specific technology covers the corporate skills and capabilities from general activity and experience of each individual firm. Robock (1980) and Chudson (1971) have constructed technology taxonomy by separating product designs, production techniques and managerial functions. Madeuf (1984) suggests a distinction between "alienated' technology and "socialized" technology. Alienated technology includes information, which is not free such as secret know-how. Conversely, "socialized technology" does not imply any specific transaction.

The above definitions provided highlights various meanings that different researchers attach to the concept of technology. Some definitions given above classifies technology as a 'process' whiles others also view technology as a 'product'. The table below (Table 2.1) summarises various definitions of technology and also helps to identify whether technology is just a 'process', 'product' or both. The table gives the definition of technology in a chronological order to show how the definition of technology has changed over the years.

Table 2.1: Various Definitions of Technology from Previous Literatures

Year	Scholars	Definition	Process/Product
1968	Merrill	Technology connotes the practical arts, bodies of skills, knowledge and procedures for making, using, and doing useful things.	Process
1968	Strassman	The tools, a stockpile of utensils, but to a kind of tool-using behaviour, a set of methods for making specific goods.	Process and Product

1970	Jones	The way in which the resources inputs are converted into commodities.	Process
1971	Hawthorne	The application of science to solve well-defined problems.	Process
1972	Galbraith	The systematic application of knowledge to practical tasks.	Process
1976	Teese	A set of knowledge or experience related to the production of a product or the implementation of a process	Process
1981	Hawkins and Gladwin	The specialized knowledge pertaining to the production of the goods and services in organized economic activity, including the knowledge and skills required to manage a set of interrelated technical processes.	Process
1983	Pacey	The application of scientific and other organized knowledge to practical tasks by ordered systems that involve people and organizations, living things, and machines.	Process
1985	Mackenzie and Wajcman	Technology can be seen in three ways: the physical objects themselves; the human activities that take place in conjunction with these physical objects; and as the human knowledge that surrounds these activities	Process and Product
1987	Woolgar	An integration process of physical objects, the process of making the objects and the meaning associated with the physical objects. These elements are not distinctive and separable factors, but form a seamless web that constitutes technology	Process

1989	Goulet	The application of science because of their special relationship.	Process
1991	Methe	A process where its origins and destination are connected and its dynamic nature are highlighted.	Process
1992	Natarajan and Tan	The knowledge or expertise that is required in the production or assembly of a given good. Technology therefore embodied in the related machinery that is utilized by a firm.	Process and Product
1996	Burgelman et al.	The theoretical and practical knowledge, skills, and artefacts that can be used to develop products and services as well as their production and delivery systems. Technology is embodied in people, materials, cognitive and physical processes, facilities, machines and tools.	Process and Product
1998	Lovell	Technologies are separated into 'product technologies' (associated with the physical and engineering aspects of equipment) and 'process technologies' (associated with the processed by which problems are solved).	Process and Product
2002	Tihanyi and Roath	Information such as a patent, know-how or trade secrets. Conversely it can be modified as equipment, component assemblies/parts or as a final product. Production techniques/processes, which require necessary skills to apply different methods of production, represent a combination of tangible and intangible technology. Technology can also include information that is not easily reproducible or transferable.	Process and Product

2003	Maskus	The information necessary to achieve a certain production outcome from a particular means of combining or processing selected inputs which include production processes, intra-firm organizational structures, management techniques, and means of finance, marketing method or any of its combination. Technology may be codified in formulas, blueprints, drawings, and patent applications or uncodified in the sense of requiring implicit know-how on the part of personnel.	Process
2006	Reisman	The development and application of tools, machines, materials and processes that help in solving human problems.	Process and Product
2014	Selwyn	At the basic level technology is understood as the process by which humans modify nature to meet their needs and wants	Process

Source: Sazali & Radaun (2011) and Selwyn (2014)

2.2.3.2 Summary

Based on the above discussion, technology encompasses many different interpretations and views depending on the authors underlying perspectives. Therefore, various authors are likely to hold different views and perception on the concept of technology. However, it could be noted that most researchers view technology as a process than as a product. This process they mean refers to the systematic way of doing things, which eventually leads to transformations for goods and services.

2.2.4 Educational Technology

Naeve (2010) highlighted that the concept of educational technology is very flexible and as such efforts should be made to give a careful definition of the term. Literature on the subject area has shown that several organizations and scholars have made efforts to define the concept of educational technology from 1960 to date, which provides the idea

of how educational technology has evolved over the past decade. It should be noted that the definition of educational technology has changed over the past years due to improvement in technology and innovations around the world (Entwistle *et al*., 2011).

Thus, Association of Education and Communication Technology (AECT) and other individual researchers becomes highly committed for making new definitions of the field since its recognition as a field of study in 1963 to date. For the purpose of this study, the AECT selected to be the main body for the definitions of educational technology and the section below would give a brief overview of the association.

2.2.5 Overview of Association of Education and Communication Technology (AECT)

The Association for Educational Communications and Technology (AECT) is an academic and professional association of several educators and other researchers whose activities are directed toward improving teaching and learning through technology. In the nutshell, this association promotes the use of technology in the educational settings. AECT members may be found in colleges and universities; in the Armed Forces and industry; in museums, libraries, and hospitals; in the many places where educational change is underway. AECT members carry out a wide range of responsibilities in the study, planning, application, and production of communications media for instruction (AECT handbook and policy manual, 2015).

The Association has become a major organization for those actively involved in the designing of instruction and a systematic approach to learning. It provides an international forum for the exchange and dissemination of ideas for its members and for target audiences; it is the national and international spokesperson for the improvement of instruction and learning; and, it is the most recognized association of information concerning a wide range of instructional and educational technology. The association has international affiliates who are all passionate about finding better ways to help people learn. AECT is the oldest professional home for this field of interest and has continuously maintained a central position in the field, promoting high standards, both in scholarship and in practice (AECT handbook and policy manual, 2015).

The following would highlight the chronological order of definitions given by AECT and some other important researchers who have worked tirelessly to improve the field of educational technology. Due to cultural differences, technology varies from one year to the other; however, with great efforts by the association, it has been able to provide definitions for education technology, which spans across specific periods of time so long as that definition describes the role of technology for that period of time in education. If there is a change in the role of technology in the educational setting, a new definition is given to incorporate the change in the role of technology in education in that particular year. This has led to the association providing the 1963, 1970, 1972, 1977, 1994 and 2008 definitions of Educational Technology.

2.2.5Chronological order of definition given by AECT and other researchers

This section focuses on 1963, 1970, 1972, 1977, 1994 and 2008 definitions of Educational Technology. For effective analysis, this section provides the differences between the definitions.

- **Educational Technology: 1963**

Reiser (2012) asserted that educational technologies before 1963 were merely seen as and referred to as '*instructional media'*. By that he mean, educational technologies represent any physical approach by which educational instructions are presented to school learners. However, Karchmer-Klein (2007) was of the opinion that the origination of educational technologies could be traced to the early days of the 20th century when the field of educational technology was first being produced. Landow (2006) on the other hand also pointed out that during the 1920's public schools in America increased their use of visual materials such as films and pictures in their classroom activities. As such educational technologies started to emerge during this period. This description by Landow was captured in the first definition of the concept of educational technologies by AECT.

Ahmad (2015) put forward that 1963 was the very starting year where the first definition of educational technologies was established among major professional bodies, and it indicates that the field was not simply about media, but it is beyond that as the definition was given. Ely (1963, p. 14) stated the first definition given by the AECT in 1963 as

follows:

> *"Audio Visual Communication is that branch of educational theory and practice primarily concerned with the design and use of messages which control the learning processes. It undertakes: a) the study of unique and relative strengths and weaknesses of both pictorial and non-representational messages which may be employed in the learning process for any purpose; and b) the structuring and systematizing of messages by men and instruments in educational environment. These undertakings include the planning, production, selection, management, and utilization of both components and entire instructional system. Its practical goal is the efficient utilization of every method and medium of communication which can contribute to the development of the learners' full potentials".*

We could deduce from the above definition that in 1963 the concept of educational technology was simply referred to as '*audio visual communication'*. However, the definition highlighted above shows that rather than relying on media only, it also shows "the design and messages'', which control the learning process (Laurillard, 2010). In addition, the 1963 definition also shows a series of steps that the individual learner should undertake in designing and using such messages. These steps include planning, production, selection utilization and management of instructional materials. Reiser & Dempsy (2012) also added that the 1963 definition places more emphasis on learning rather than instruction.

- **Educational Technology: 1970**

Due to the changing nature of technology, the AECT revised and reproduced a new definition to what educational technology mean in 1970. The commission incorporated some major ideas into the term to show what educational technology mean and how it operates as at that time in 1970. As at 1970, the commission gave two definitions in which educational technology could be referred to:

> *"In its more familiar sense, it (Instructional Technology) means that media is born of communication revolution which can be used for instructional purposes alongside of the teacher, text book and black board ..... The process that make*

up instructional technology; television, film, overhead projectors, computers, and other items of hardware and software....."

The commission gave a second contrasting definition to the one above and referred to educational technology as a 'process', stating that

"Instructional technology ... is a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication and employing a combination of human and non-human resources to bring about more effective instruction" (Commission on Instructional Technology, 1970).

Seels and Richey (1994) identified that the second definition of 1970 has some major characteristics that proved its comprehensiveness as compared to the former one. The characteristics are:

- There is the view that educational technology must aid teaching and learning through specific objectives
- Methods and techniques used to deliver these specific objectives should be based on research carried out
- The phrase "more effective instruction" is an important outcome which shows how the end results of using educational technologies.

However, it is important to note that the second definition mentions a "systematic process" which includes the specification of objectives and design, implementation, and evaluation of instruction (Reiser, 2012).

However, Silber (1970, p. 30) established another definition of the field of instructional technology, which was also very important due to its difference from the 1963 definition. Sibler defined the field as:

"Instructional Technology is the Development (Research, Design, Production, Evaluation, Support-Supply, Utilization) of Instructional Systems Components (Messages, Men, Materials, Devices, Techniques, Settings) and the Management

of that development Organization, Personnel) in a systematic manner with the goal of solving educational problems".

The main differences between Silber's definitions from the previous one are:

- The Silber's definition encompasses design, production, utilization, and evaluation of technology; whereas previous definitions referred mainly to individuals‟ role as developers of a product (Seels & Richey, 1994).

- Silber's definition also changed the scope of field by adding new components to the definition, which in turn made the roles of educational technologists; broaden (Seels & Richey, 1994).

- Lastly, in the definition Silber introduced the term „problems‟ and stated those instructional technologists' goals are to systematically solve educational problems (Seels & Richey, 1994).

Educational Technology: 1972

The AECT made an attempt to revise the 1970 definition of educational technology to incorporate the changing nature of the role of technology in the classroom setting. It should therefore be noted that the association moved from the term '*instructional media'* to '*educational technology'* during this particular year, and this was shown in the 1972 definition. This Allowed for emphasis on both instruction and learning, and was presented in the 1972 definition of the concept. The association defined the 1972 definition as follows:

"Educational technology is a field involved in the facilitation of human learning through systematic identification, development, organization and utilization of a full-range of learning resources and through the management of these processes" (AECT, 1972, p. 36).

The definition states that educational technology is a systematic process for developing and using instructional resources (Seels & Richey, 1994). These two ideas were carried

over from the previous definitions and the ideas are incorporated in 1994 definition. For instance, some of the roles identified in the previous definitions are repeated in the definition such as the role of development, organization, management and utilization.

On the other hand, Ely, (1972) pointed out that the 1972 definition identified educational technology as a field in one hand and the ideas of "control" and "specific objectives" are replaced by the ideas of "process" and "facilitation of human learning" in the definition on the other hand.

- **Educational Technology: 1977**

In 1977, the Association of Educational Communication and Technology (AECT) adopted a new definition of the field. The definition is also different from previous definitions in many ways, which are:

- The definition is length in the sense that it consisted of sixteen statement spread over seven pages of text
- The definition was followed by nine pages of tables elaborating in some concepts mentioned in the statement as well as other nine chapters that provide further elaboration.

Nevertheless, the first sentence of the definition statement provides a sense of its breadth:

> "Educational technology is a complex, integrated process involving people, procedures, ideas, devices and organization for analysing problems and devising, implementing, evaluating and managing solutions to those problems involved in all aspects of human learning" (p. 1).

Riser and Dempsey (2012) identify five features of the 1977 definition, which make it different from the previous ones:

- The 1977definition placed a good deal of emphasis on a systematic (complex and integrated) design process; the various parts of the definition mentioned many of the steps in most current systematic design process (such as design, production, implementation and evaluation).

- The definition was the first kind of such definition to mention the analysis phase of the planning process, which at that time was the beginning to attract attention among the professional of the field.
- Finally, the definition broke new ground by incorporating other terminologies that within short period was becoming commonplace in the profession. For instance, the definition included the term "human learning problems and solutions" foreshadowing the frequent current use of these terms, especially in the context of performance improvement.

Educational Technology: 1994

During the period of 1990 to the mid of 1994s, many developments affected the field of educational technology (Rieser, 2012). Whereas behavioural learning theory had previously served as the basis for many educational technology practices employed by those in the field, cognitive and constructivist learning theories began to have major influence on design practice (Rieser, 2012). However, the field was also greatly influenced by technological devices such as microcomputer, interactive video, CD ROM, and Internet. Furthermore, the drastic expansion of Information and Communication Technology led burgeoning interest in distance learning and new instructional strategies such as collaborative learning gained in popularity. As a result of these and many other influences led to 1994 definition.

The 1994 AECT definition of the field has been the most commonly used definition to define the field of instructional technology. This definition defined the field as:

> *"Educational technology is the theory and practice of design, development, utilization, management and evaluation of processes and resources for learning". (Seels & Richey, 1994, p. 43).*

However, the 1994 definition describes the field in terms of five domains (design, development, utilization, management and evaluation) five areas of study and practice within the field. Seels and Richey (1994) explained that there is synergistic relationship between the domain as they are virtually represented by a wheel-like-virtual, with each

domain on the perimeter is connected to a theory and practice hub. This representation scheme was designed to prevent readers from erroneous conclusion that these domains are linearly related (Seels and Richey, 1994).

The 1994 definition is not like 1970 and 1977 definition, because the 1994 definition does not describe the field as process oriented. In fact, the authors of 1994 definition stated that they purposely excluded the word "systematic" in their definition so as to reflect present interest in alternative design methodologies such as constructivist approaches (Seels & Richey, 1994). Nevertheless, Reiser, (2012) states that the five domains that are identified in the definition are very similar to the steps that compromise the "systematic" process identified in the previous two definitions. He also clarified that each of the five domains (design, development, utilization, management, and evaluation) or a synonyms is used directly or indirectly in one or both of the previous definition.

Moreover, 1994 definition moves in some other new directions and revisits some old ones. For instance, much like the 1963 definition, the 1994 definition describes the field in terms of theory and practice, emphasizing the notion that the field of instructional technology is not only an area of practice, but also an area of research and study.

- **Educational Technology: 2008**

In 2008, an AECT committee produced a book that presented a new definition of the field of Education Technology, which defines the field as:

> *"Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources" (AECT, 2008, p. 7).*

It is observed from the 2008 definition that the term "***Educational Technology***" was used instead of "***Instructional Technology***". This shows the dynamic nature of the field and its potential growth in the upcoming years. According to terminology committee of the Association for Educational Communication and Technology, education is more general than instruction.

However, 2008 definition involves some key terms (elements), which were not mentioned in the previous definitions of the field. Thus, these terms need to be clarified precisely as follows:

Ethical practice: this term focuses on the fact that the professionals of the field must maintain the high level of professional conduct (Rieser, 2012). The AECT code of ethics includes principles intended to help members individually and collectively in maintaining a high level of professional conduct (Welliver, 2001). AECT's code of ethic is divided into three categories:

- Commitment to the individual such as protection of rights of access to materials and effort to protect health and safety of professionals
- Commitment to society: such as truthful public statement regarding educational matters or fair and equitable practices with those rendering service to the profession, and
- Commitment to the profession: such as improving professional knowledge, skills and giving accurate credit to and ideas published

Each of the three principle areas has several listed commitment, which help inform Educational Technology professionals regarding their appropriate actions, regardless of their educational context or role. However, consideration is given to researchers, professors, consultants, designers, and learning resources directors, to help in shaping their own professional behaviours and ethical conduct.

Facilitate learning: this indicate that there is shift in views of learning and instruction reflected in cognitive and constructivist theories which caused a dramatic change in assumption and connection between instruction and learning. Earlier definitions of the field implied a more direct cause-effect relationship between instructional interventions and learning. For instance, the 1963 AECT definition refers to *"design and use of messages which control the learning process"*. Later definitions were less implicit, but continued to imply a relatively direct connection between well-design, well-delivered instruction and effective learning. But, with the recent paradigm shift toward greater learner ownership and responsibility has come a role for technology that is more

facilitating than controlling (AECT, 2007).

Facilitation of learning includes the designing of environment, the organizing of resources and the providing of tools. It also entails the use of direct instruction within the pre-specified framework in some cases, or the use of open-ended enquiry methods to guide further learning in other cases (AECT, 2008).

Improve performance: performance simply means learners ability to use and apply the new capabilities they gained (AECT, 2008). Rieser (2012) stated that the authors of the 2008 definition emphasized that it is not just enough to help learners acquire inert knowledge. Instead, the instructional goal should be to help learners apply the new skills and knowledge they have gained.

However, the 2008 definition of the field uses the term creating; ***using and managing*** to identify major functions perform by educational technology professionals. The creation function includes all the procedures involved in the generating instructional interventions and learning environment, which include analysis, design, development, implementation and evaluation. The ***utilization*** function includes the selection, diffusion and institutionalization of instructional methods and materials. Moreover, the ***management*** functions are delivery system, personnel and information management. However, the authors described that these three terms are used to describe the major functions of educational technology (Rieser, 2012).

Technological processes are the processes involved in the systematic application of scientific and other organized knowledge to accomplished practical task. ***Technological resources***: are referred to hardware and software that are really associated with the field, such as still picture, video, computer program, DVD player and so on.

In conclusion, definition of educational technology is flexible and dynamic; as the field of educational technology constantly undergoes changes from time to time due to technological innovations we experience in the globe, which subsequently affect the field. Thus, the definition of educational technology is still open for the professionals of the field.

2.2.5.1 Summary

Due to flexibility and vitality nature of the field of educational technology, many attempts have being made by professionals of the field to define educational technology prior to 1960 to date for the purpose of providing a well comprehensive definition of the field, which is suitable to the particular period of time. The AECT and other researchers made tremendous efforts to define the field as technology advances. From the various definitions given, Educational Technology is the efficient organization of any learning system adapting or adopting methods, processes, and products to serve identified educational goals. This involves systematic identification of the goals of education, recognition of the diversity of learners' needs, the contexts in which learning will take place, and the range of provisions needed for each of these.

2.3 Advantages and Disadvantages of Technology Usage

Proponents of educational technology contend that technology accommodates individual learning rates and styles and offers access to learning at any time and in any location. They believe that the use of technology in the classroom provides students with the opportunity to (Wheeler *et al*., 2008; Bebell, 2005; Honey *et al*., 2005; Waddoups, 2004; Gahala, 2001; Mercier *et al*., 2017):

- Acquire the technological skills they will need for future employment;
- Develop critical thinking, problem-solving, and communication skills;
- Collaborate with peers;
- Engage in hands-on learning activities; and
- Receive immediate feedback.

Advocates also claim that teachers benefit from the introduction of technology into the classroom. Technology gives teachers the ability to tailor instructional materials and assessments to directly address their students' learning needs; offers access to more authentic material to assist in the development and delivery of lessons; and provides

additional sources of information for their students to draw upon in the classroom (Dunleavy *et al*., 2007; Waddoups, 2004; Healey, 2001; Cho and Kenneth, 2017).

Another strand of the literature revealed some other justification for technology integration in education. Technology in education in effect offers the following benefits to the educational community and the society:

- An enhanced learning environment for learners: Technology provides a motivating learning environment whereby learners are given the opportunity to be constructively engaged with instruction. Research has revealed that, if properly implemented, learners can reap the pedagogical benefits of technology in the classroom. Experts today increasingly advocate the implementation of the constructivist model of learning rather than of the traditional instructivist model (Means, 2000; Yanyan *et al.*, 2017).
- A powerful tool to supplement teachers' instruction in classroom: If properly used by teachers, technology can foster more interest in learning on the part of students, and teachers can use it in the instruction of their respective subjects. Technology has the potential to make instruction easier, more challenging and motivating for teachers (Waddoups, 2004; Healey, 2001).
- An administrative tool for teachers and administrators. Apart from classroom instruction, teachers are also involved in class administrative duties such as student record keeping, lesson planning, preparing hand-outs, tutorials and slides, preparing exams papers, marking papers and recording of results, performing some type of statistical analyses on marks, and so on (Poole, 2008; Benneth *et al*., 2017). Administrators are also involved in a variety of work that requires technology, such as the computation of school performance for a certain year, keeping of records of employees, and preparation of school budget. Technology can therefore become an extremely useful tool in handling of a number of the administrative tasks for both teachers and administrators (Jackson, 2004, Zrnec and Lavbic, 2017).
- Increased access to education and inclusive education in the school. Schools have had at heart the integration of all students regardless of their cultural, racial and socio-economic backgrounds, as well as their strengths and weaknesses in any area into an

integrated school community (Hopey and Knuth, 1996). Technology has been recognized as providing a means of helping schools achieve this goal of promoting equal access to education. Also, it has the potential to offer increased access to education to students with disabilities (Zucker, 2005).

- A communication platform. In the not so distant past, geographical distance was a major hurdle when it came to communicating with people around the world. Technology has changed that. Through networks and the Internet, it is now possible to communicate with anyone in the world (Johnston, 2000). Technology has also presented schools with an excellent medium to share ideas and experiences. Students, teachers, and administrators can communicate, exchange knowledge and concerns, meet experts and peers, and share work in collaborative projects through the use of technology (Alberta Education, 2006; Zhao and Sullivan, 2017).
- A passport to employment and to gaining competitive edge in the global economy. Increasingly in developed and developing countries, job markets are demanding a computer literate workforce. In the not too distant future, knowledge and skills of computer use will become a basic requirement for securing a job and for a nation to compete for a share of the global market (Bonifaz and Zucker, 2004). Technology in education can prepare students now to integrate the world of work and competition tomorrow.

On the other hand, critics list a host of reasons why technology should not be emphasized in schools (Dunleavy *et al*, 2007; Valdez, 2005; Jackson, 2004; Cooley, 2001; Wright, 2001; Weiner, 2000; Oppenheimer, 1997). For example, they contend:

- Some educators have endorsed technology indiscriminately, as if the use of computers automatically produces quality teaching and learning experiences.
- Too many schools emphasize technology over learning. For example, the ability to create an attractive document doesn't mean that students have a greater understanding of concepts in the core academic areas.
- When spending on technology increases, spending on other important programs and activities (such as art, music, sports, and field trips) decreases.

- Technology is not as cost effective as other interventions because equipment requires extensive support.
- Technological innovations have often proven unusable because schools lack the capacity to link equipment use with instructional objectives.
- The use of technology requires teachers with strong classroom management skills. Teachers must carefully monitor students' use of equipment and often have to provide complicated procedural explanations.
- Computers reduce students' opportunities for socialization.
- Some teachers use computers to entertain students with irrelevant activities.
- Children are at particular risk of physical problems, such as repetitive stress injuries or eyestrain.

2.4 Technology's Effect on Student Achievement

Evaluations have concluded that the use of technology in the classroom has a positive impact on students' motivation, engagement, self-directed learning, and peer collaboration. Studies have also linked the introduction of technology to increased attendance rates and fewer disciplinary referrals. Other benefits reported have included higher levels of self-confidence, more positive attitudes toward learning, and the development of problem solving, communication, and organizational skills. This research is outlined below.

- Apple Classrooms of Tomorrow (ACOT) was the first large-scale initiative to provide one-to-one computer access to students and teachers. The program operated in 13 universities from 1985 to 1998. Evaluations of ACOT concluded that participating students developed collaborative, problem solving, and communication skills, became more independent learners, and had increased levels of self-confidence (Marshall, 2002; Cooley, 2001; Apple Computer, 1995).
- Stratham and Torell (1999) reviewed 200 studies on the effects of technology on student learning. They concluded that, when integrated appropriately, the introduction of technology into classrooms led to increased teacher-student interaction and

encouraged cooperative learning, collaboration, problem solving, and inquiry. In addition, students in "computer-rich" classrooms were found to have fewer absences and lower dropout rates.

- Waddoups (2004) analysed 34 research studies that examined the impact of technology integration on student outcomes. He concluded that the use of technology in the classroom was tied to increased student motivation, more positive attitudes, and higher levels of self-esteem.
- Bebell (2005) conducted an evaluation of the Technology Promoting Student Excellence one-to-one computing initiative University of Pennsylvania. Results indicated that teachers believed participation in the program increased student motivation and engagement and improved students' ability to work both in groups and independently. The program was believed to have the greatest impact on at risk and low-achieving students, as evidenced by their increased classroom engagement and their improved ability to retain content material and work collaboratively with peers.
- Multiple evaluations have been conducted of Microsoft Corporation's *Anytime Anywhere Learning Project*, a program that provided students and teachers at 800 schools with laptops for use at school and at home. Evaluations consistently reported that, following implementation of the initiative, students were more involved in their school work, collaborated more with their peers, directed their own learning, and relied more heavily on active learning strategies (Donovan *et al*., 2007;Microsoft, 2000).

2.5 Strategies that Contribute to Technology's Program Success

National Center for Education statistics (2003) and Selwyn (2014) argue that the introduction of educational technologies does not itself translate into better instructional outcome and academic achievement. Various researches have demonstrated that the actual manner in which technology programs are implemented is equally, if not, important than the type of technology used. Some studies have also found that the least

effective educational technology programs were those that simply placed hardware in classroom, with little or no regards for the integration of the educational technologies into classroom curriculum, issues of equity, or the provision of teacher support (Valdez, 2005; Barrios *et al.*, 2004; Marshall, 2002, Fouts, 2000; Sivin-Kachala & Bialo, 2000).

According to Zucker (2005) and Hopey & Knuth (1996) there are many influencing factors that show the level of educational technology's effectiveness, such as the extent to which teachers are trained and prepared to implement the technology's program, the level of student's access to educational technology, and the provision of adequate technical support. In other words, higher education authorities should build a comprehensive program, not just supply students and staff with only machinery (Sorgo *et al*., 2017; Stratling, 2017). With the aid of existing literatures on educational technologies, following is a comprehensive list of strategies that past researchers have concluded contribute to the success of educational technologies in higher education.

Planning - School administrators are most often compelled to provide learners with access to the most recent educational technologies and adopt initiatives with proper and careful planning (Donovan *et al*., 2007). It has however been documented repeatedly that, a proper and detailed planning is a prerequisite for effective implementation of educational technology into classroom programs (Honey *et al*., 2005; Gahala, 2001; November *et al*., 1998; Cradler, 1996). Planners should align the program with the higher education's primary goals and determine how the educational technologies relate, support and integrate with other educational plans at the district and national level.

During the planning stages, staff and student training required to fully integrate educational technologies into classrooms' curriculum, as well as, the technical support staffing needed mostly to main the these technologies, should be highly specified (Alberta Education, 2006; Protheroe, 2005; Zucker, 2005; Cradler, 1996; Hopey & Knuth, 1996). Planners at the higher educational level must conduct a thorough evaluation of the technology integration costs, including: hardware and software; related equipment (Printers and scanners and computer furniture); replacement of obsolete equipment; technical support; and other associated expenses such as connectivity, wireless networking, security, insurance, and digital content (Rodriguez & Knuth, 2000; Freeman,

2002; Whitehead *et al*., 2003; Cradler, 1996). See appendix F for designed sample of contents of educational technology Planning process.

Providing strong leadership - Various strand of the literature reveals the importance of the higher education authority's commitment to the technology initiative to function effectively under any educational institution (Cooley, 2001). According to Poole (2008), strong leadership by school boards, heads of departments, ministry of education and other stakeholders in the educational sector play a key role in developing school environment, which becomes conducive to the effective use of educational technologies. Leaders should advance a shared vision, provide a financial, long-term commitment to the program, and communicate regularly with universities and other stakeholders about the program implementation (Poole, 2008; Alberta Education, 2006; Zucker, 2005; Jackson, 2004; Educational Research Service, 2002; Johnston, 2000; Sivin-Kachala & Bialo, 2000).

Integrating technology into the curriculum - Experts agree that technology should not be treated as a separate subject or an occasional project, but as a tool to promote student learning on a daily basis. Educators must consider how technology will be used to support the curriculum and how integrating technology into instruction will support the district's broader instructional goals (Valdez, 2005; Cooley, 2001; Hopey & Knuth, 1996). Chaika (2006) reported that successful technology programs selected applications that supplemented classroom instruction and used them to reinforce, enhance, and elaborate on existing instructional practices.

Providing teachers with professional development - Research clearly indicates that the single most important factor in the successful use of technology is teachers' ability to integrate technology into the curriculum (National Education Association, 2008; Chaika, 2006; Valdez, 2005; Jackson, 2004; Rodriguez & Knuth, 2000; Sivin-Kachala & Bialo, 2000; Kimble, 1999). Cooley (2001) stated that when school districts spend significant amounts of money on technology but don't prepare teachers to implement the program, the technology does little to enhance student learning.

Before professional development is designed, each teacher's current level of technological skills should be determined (Gahala, 2001). A study conducted by Zhang (2005) found that a needs-based survey, administered prior to professional development sessions, helped schools design training that matched teachers' learning goals.

Although research has not identified any one best model of effective professional development, approaches that have been found to be effective include:

- Providing training in the skills needed to use the technology, in addition to strategies for its successful integration (National Centre for Education Statistics, 2003). Teachers have consistently reported, "Lack of time to become acquainted with technology and how to use it" as one of the most significant barriers to its effective classroom use (National Center for Education Statistics, 2000).
- Providing hands-on experiences using new skills and developing units in realistic settings with authentic learning tasks (2004; Rodriguez & Knuth, 2000).
- Modelling of appropriate integration strategies (Alberta Education, 2006).
- Instruction through case studies, allowing teachers to adapt and apply others' experiences to their own classrooms (Johnston, 2000).
- Linking professional development to the specific lessons currently being taught and to the skills students is in the process of mastering (CEO Forum on Education and Technology, 2001).
- Training on how to individualize technology applications to support different student learning styles.
- Providing a variety of formats. Teachers have reported they value both formal training activities, such as workshops, and informal opportunities, such as team meetings, co-teaching opportunities, and demonstration lessons (Bonifaz & Zucker, 2004).
- Providing mentors, coaches, or peer teammates to give teachers opportunities for ongoing discussion and reflection with other teachers (Alberta Education, 2006; Zucker, 2005; Rodriguez & Knuth, 2000). O'Bannon and Judge (2004) found that teachers who shared strategies for technology integration with colleagues used computers more effectively in the classroom.

Involving teachers in the planning and implementation of technology programs - Experts agree that when teachers have input into planning and purchasing decisions, they are more likely to perceive the selected technology as useful and integrate the technology into their classrooms (National Education Association, 2008; Donovan *et al*., 2007; Marshall, 2004). The RAND Critical Technologies Institute (1995) examined schools that had been recognized by the U.S. Department of Education for their effective use of educational technology. The researchers found that teachers in these exemplary schools were involved in developing the program's learning goals and determining what part technology would play in meeting those goals. Teachers selected the equipment and technology-supported activities that would be used in their classrooms.

Providing all students and teachers with the appropriate tools - Successful technology programs provide students and staff with access to updated software and well-functioning equipment (Alberta Education, 2006; Chaika, 2006; Zucker, 2005). Technology programs rarely have a positive impact on students when schools are limited to one computer for every 30 students or when available computers are out of date (Cooley, 2001). The Teachers Talk Tech 2005 survey found that over 61 per cent of teachers nationwide believed there were too few computers in their classrooms. Experts suggest that one computer is needed for every two to five students (Cooley, 2001; Stratham & Torell, 1999). The National Education Association (2008) recommended that the technology available to students and teachers be compatible with the technology in general use outside of schools. Researchers have suggested that software be age appropriate, engaging, flexible enough to be applied to many settings, relevant to the content areas being studied, and able to be easily integrated into existing curricula (Waddoups, 2004).

Evaluating technology programs - Experts recommend that school districts have a system in place for evaluating technology programs' impact on teaching and learning. Funding sources are usually more willing to support technology investments when there is research-based knowledge about the program's effect on instructional outcomes (Alberta Education, 2006; Culp *et al*., 2003). Districts often make the mistake of studying

a variety of outcome measures that are not even associated with their program's goals (for example, when a district implements a program to increase equitable access to computers, but then evaluates the program's impact on students' reading and math test scores). Bonifaz and Zucker (2004) have suggested that districts measure only the variables related to their specific program objectives.

Despite the approach provided above for effective technology usage Higher learning Institutions, some universities still face other challenges in their quest to integrate ICT in Education. The following would provide the actual challenges some educational institutions faces for the implementation of ICT in education.

2.6 ICT Implementation challenges in Higher Learning institutions

Despite the achievements revealed by some of the universities in implementing ICT for teaching and learning processes, these universities still face a lot of challenges in undertaking such a process.

- **Lack of systemic approach to ICT implementation**

Integration of ICTs in the functions of any organization is a complex process that needs to be fully conceptualized and defined from the beginning. However, this is not the case in many higher learning institutions in developing countries as most of them have embraced the ICT integration process without clear plans to guide the way. The institution of ICT policy and strategic plan should be defined to provide a framework for the development and implementation of specific ICT projects (Waddoups, 2004). The diversity and competing interests of different stakeholders in the institution should be recognized when developing ICT policy and a strategic plan. The following issues, amongst others, should be taken into consideration (Stratham and Torell, 1999): (i) ICT infrastructure already in place; (ii) ICT skill levels in the institution; (iii) number of staff and students in each department and projected growth; (iv) academic management process: curriculum development, assessment methods and administration; (v) cost-

effectiveness analysis (including hidden costs) and the choice of proper technologies for the needs of the institution; and (vi) staff development in new technologies.

- **Awareness and attitude towards ICT's**

It is important for all stakeholders in the institution to know the existing ICT facilities and services and their importance in relation to their specific tasks. However, according to Tusubira and Mulira (2004), there tends to be some vague knowledge about ICTs, some interpreting them as simply advanced technologies that require a lot of money and very advanced skills. They are not appreciated as a means of creating efficiency and cost-effectiveness. Lack of awareness goes along with attitude. Positive attitude towards ICTs is widely recognized as a necessary condition for their effective implementation (Woodrow 1992). Full involvement of all stakeholders in the implementation process is a key to addressing awareness and attitude problem. Formally organized awareness programs, visits to similar institution where success has occurred, and short trainings can contribute to raise the awareness and change the attitude of stakeholders towards facilities and services.

- **Administrative support**

Administrative support is critical to the successful integration of ICTs into teaching and learning processes. Administrators can provide the conditions that are needed, such as ICT policy, incentives and resources. The commitment and interest of the top management and other leaders at every level is the most critical factor for successful implementation of ICTs. According to Cameron and Ulrich (1986), a transformational leadership is a leadership that involves a process of fundamental change, which is required for the institutions to adapt to changes brought about by the information society. Dwyer *et al* (1997) emphasize that for the integration of ICTs to be effective and sustainable, administrators themselves must be competent in the use of the technology, and they must have a broad understanding of the technical, pedagogical, administrative, financial, and social dimensions of ICTs in education.

- **Technical support**

This includes issues like installation, operation, maintenance, network administration and security. This is an important part of the implementation and integration of ICT in education system. In most cases however, technical support is not available, which implies that trainers and students require some basic troubleshooting skills to overcome technical problems when using ICTs. However, in most of the developing countries including Tanzania there are very few technical experts to implement and maintain ICTs (Bakari *et al*., 2001; National Committee for WSIS Prepcom II 2003). Appropriate strategies should be in place to ensure that integration of ICTs in teaching and learning process goes together with the recruitment, training, retaining and retention of required staff.

- **Transforming higher education**

Many institutions fail to integrate ICTs into teaching and learning because they are using ICTs to replicate their traditional practices, content and control. Their plans appear to be driven by ICTs and not by pedagogical rationale and focus (Ehrmann 1995). However, effective integration requires a transformation process where all stakeholders are involved to re-examine their existing structures and practices, as pointed out by Bates (1997), if universities and colleges are to successfully adopt technologies for teaching and learning, many more than minor adjustments in current practice will be required. Indeed, the effective use of technology requires a revolution in thinking about teaching and learning. Part of that revolution necessitates restructuring universities and colleges – that is, changing the way higher education institutions are planned, managed and organized (Pavlo *et al*., 2017).

- **Staff development**

Integration of ICT in teaching and learning does not only deals with introduction of new hardware and software, but also both trainers and the students have to adopt new roles, and change their ICT behaviours and ways of teaching and learning. As Farrell (1999) points, training and workshops are needed not only to improve the skills of the instructors, but also as a means of getting them involved in the process of implementing and

integrating ICTs in teaching and learning. For example, faculty staff requires training not just in the choice and use of appropriate technologies, but more fundamentally in how people learn and in instructional design (Bates, 1997). Pelgrum (1999) recommends staff training to be a continuous process for regular updates with the development of ICTs.

- **Lack of ownership**

It is critical that all stakeholders contribute to and own the policy and the plan. Institution-wide consultations are necessary in the identification of challenges, and in proposing areas for ICT application (Lovell, 1998). Stakeholders must agree on the projects to be implemented, including their role therein. Teachers and students must see ICTs as tools rather than as competitors for their teaching and learning (Selwyn, 2014). A related challenge is getting stakeholders in an organization to think for the organization, rather than the natural tendency of considering the interests of their particular departments (Valdez, 2005).

- **Inadequate funds**

Financial resources form a key factor to the successful implementation and integration of ICTs in education. It is obvious that countries with higher financial resource bases stand a good chance than those with limited resources to reap benefits offered by ICTs (Selwyn, 2014). In addressing the problem of limited funds and sustaining donor funded projects, higher learning institutions can do the following (Valdez, 2005; Barrios *et al* (2004): (i) adopt freeware and open source software for teaching and learning activities; (ii) continuously press for more funds from their governments; and (iii) diversify sources of funds to have a wide financial base.

2.7 Planning for Technology Integration in Education

Just like any project, technology integration in educational settings requires an implementation plan. Without a needs-analysis, proper planning and management activities, projects are doomed to slow progress or outright failure (Beetham and Sharpe,

2007; Sharpe *et al*., 2010). Levine (1998) emphasizes the importance of having a plan that is based on real school needs and one that is realistic, achievable, and effective. The plan should be produced, not for the sole purpose of putting technology in the classroom but to reflect the real needs of schools in order to make effective technology deployment and to produce enhanced learning environments (Tugba *et al*., 2017). The involvement of all stakeholders in the preparation and execution of the plan has been identified as a catalyst in the integration process.

Levine (1998) proposes the following the components of an effective technology integration plan in schools:

- Formulating a planning team
- Collecting and analysing data
- Formulating the visions, goals, and objectives
- Exploring available technology
- Determining training and staffing needs
- Determining a budget and funding sources
- Developing an action plan
- Implementing the plan
- Evaluation

Still relevant today is a three-phased approach to the process of systematic planning and implementation of computers in schools formulated by Cheever *et al*. (1986). The three phases are:

- Strategic planning. This involves establishing institutional goals at district/state level, identifying the necessary resources to achieve goals, planning the acquisition, deployment and disposition of the resources. Examples of strategic planning activities are the writing of long-term plan for the integration and use of computers in schools, and the appointment of citizens and committees to work towards funding acquisition.
- Management control. This is concerned with the actual acquisition of the necessary resources and planning their integration in the classroom to meet the institutional goals. Examples of management control activities are the formulation of instructional

objectives of a certain subject at a certain grade level when computers are introduced to teach and learn that subject, and the development of school-level budgets for resource acquisition and staff development.

- Operational control. This has to do with the day-to-day usage of computers in the classroom. Examples of activities are the scheduling of computer access to teachers and students, and the computer usage policies.

Levine (1998) and Cheever *et al*. (1986) thus inform us how essential it is to plan at different levels based on real needs in order to increase the probability of getting the acceptance and support of all other stakeholders both philosophically and financially. In addition to the plan given above, Sun *et al*., (2000) also put forward some systematic plan for effective implementation of ICT in education. See appendix G for Content of educational technology plan provided by Sun *et al*., (2000). Therefore, technology integration requires the preparation, implementation and evaluation of holistic plans at various levels – the classroom, school, district, state, and across the nation. It is important to ensure that these plans do not conflict with or diverge from each other. Rather, they should be compatible, integrative and synergistic.

2.8 Digital literacy

One of the significant factors or drivers for changing pedagogies has been the understanding of skills and knowledge needed by young people both for employment and for effective engagement in civic society (Hobbs and Tuzel, 2017). Previously debate about digital literacy comprised of narrow competency of skill sets with the focus on the skills required using technology effectively; however, there is now a wider understanding of the changes the use of technology is bringing, encompassed in resent research, particularly in the UK and the USA, around digital literacy (Attewell, 2001; Selwyn, 2013; Selwyn, 2016).

2.8.1Understandings of digital literacy

Gillen & Barton (2010) in their research traced the evolution of our understandings of

digital literacy from an original focus on skills required by the ICT industries towards 'softer' skills concerned with making critical judgments. They further pointed out that ''*as digital technologies have spread, matured and developed, more people are participating in the creation and collaboration that have become characteristic of the Web 2.0 wave. Approaches to digital literacy have developed alongside the application of technologies*" (Coiro *et al*., 2008).

Beetham *et al*., 2009 also offered a contrasting definition of digital literacy to such terms as competency and skills as follows:

- *"A foundational knowledge or capability, such as reading, writing or numeracy, on which more specific skills depend cultural entitlement – a practice without which a learner is impoverished in relation to culturally valued knowledge communication – expressing how an individual relates to culturally significant communications in a variety of media.*
- *The need for practice – acquired through continued development and refinement in different contexts, rather than once-and-for-all mastery.*
- *Socially and culturally situated practice – often highly dependent on the context in which it is carried out self-transformation - literacy (and their lack) has a lifelong, life wide impact."*

Gillen & Barton (2010, p. 21) argue that digital literacy are most often dynamic- in part, because technology is perceptibly developing very fast in our world –but also because human purposes continue to develop and are reshaped in collaboration. They offered a definition of digital literacy as ''*the constantly changing practices through which people make traceable meanings to using digital technologies"*

Walter (2000) (cited in Gillen and Barton, 2010) also elaborated on the concept of design in his definition of digital literacy. Digital literacy, he stated, "*are in a deep and profound sense new literacy, not merely the traditional concept of literacy – reading and writing – carried on in new media."* Given the emphasis on multimodality, new forms of literacy are required including not only the making of meanings of different communication modes but also the ability to understand the semiotics of those forms. *"If the school*

remains (obliged to) adhere to the characteristics of the former semiotic and social world, there will be an increasingly vast gap of practice, understanding, and of disposition to knowledge."

Hargittai *et al*., (2010, p. 16) also look at changing demands on learners resulting from the use of web 2.0. They say*: "Thinking differently about information is going to be crucial as web 2.0 takes off, for both teachers and learners. To tell a story orally demands a certain set of skills, but to write a good report, the information must be deployed in a different way. A television journalist, weaving pictures and sound together to tell the story, needs a whole different set of skills, manipulating the information in a new way; which academics have called "secondary orality". In the era of networking and emergent information systems, a whole new range of skills is necessary in our academic culture; the skills required in creating online frameworks for collaborative, learner-led work".*

The aim of education is to develop digital literacy; therefore an understanding of pedagogy might be as guidance to learn (Beetham and Sharpe, 2007). However Beetham *et al*., (2009), learners that is changing so radically. Thus they talk of "learning literacy for a digital age" rather than 'digital literacy' and indicate that they are open to finding major continuities in what makes for effective learning and in how institutions should provide for it.

2.8.2 Digital literacy and pedagogies

Broader and more extended definitions of digital literacy can help in developing new ideas around pedagogies. Gillen and Barton (2010) draw attention to the work of The New London Group who put forward four components of pedagogy:

- "Situated Practice, which draws on the experience of meaning-making in everyday life, the public realm and workplaces;
- Overt Instruction, through which students develop an explicit meta-language of design;
- Critical Framing, which interprets the social context and purpose of Designs of meaning; and

- Transformed Practice, in which students, as meaning-makers, becomes designers of social futures" (Cope and Kalantzis, 2000).

The UK based REVEEL project looked at how compelling is the evidence for the effectiveness of Post-16 e-learning (Beetham *et al*., 2009) and concluded that "we are now learning in technology-rich societies and need to remodel education as lifelong learning". Learners therefore need to develop a 'learning literacy' defined as:

- *"*The ability to self-manage the learning process,
- The capability of negotiating learning outcomes,
- Time to review and reflect on the learning process whilst learning,
- Finding and evaluating the use of a wide-range of digital and non-digital resources,
- The ability to share and develop this learning literacy with others."

The European iCurriculum project (Barajas *et al*., 2004, p.6), which focused on pedagogic approaches to teaching and learning, also took its starting point from the new competences that digital literacy requires. The project considered that being 'digitally literate', cannot be compared to traditional forms of print-based literacy, i.e. 'digital reading and writing'. Instead, they say, "digital literacy refers more widely to the competencies required to effectively exploit the tools, practices and symbol systems made available by digital technologies. These competences, referred to a current context of rapid change, can be seen as the ability to update on your own to take advantage of future socio- economic transformations."

They list examples of activities that require digital literacy, however making the point that these activities are rarely performed as isolated acts:

- "Modelling - the creation of digital analogues of systems for analysis and experimentation.
- Knowledge management – conducting research, combining knowledge to create new knowledge, navigating through information structures.
- Multimodality and hypertext - new ways of creating communicative documents

combining different modes and media and new ways of reading them.

- Electronic communication - not just email but whole panoply of ways in which inter-human communication is developing and how entry into communities of learners may be dependent on electronic communication.
- Game play - the ways in which playing digital games exemplifies ways of thinking and working in a digital domain, this is potentially a summation of the above activities."

2.9 Pedagogical Theories and its Implication on EduTech

This section will discuss some major learning theories developed over some decades ago and their major contribution towards the effective use of educational technologies for teaching and learning. It is not the aim of this study to provide an exhaustive survey of each learning theory; instead focus will be on how some of these theories relate to the development of technologies in education.

This section is needed because it is important to use learning theories to examine fully why and how educational technologies are used currently in formal education. It would further consider key issues of how the use of educational technologies can support, enhance and even improve learning.

2.9.1Behaviorism theory of learning

2.9.1.1 Behaviourism: a definition - Woollard (2010, p. 32) asserted that 'Behaviourism is the theory of animal and human learning that focuses upon the behaviour of the learner and the change in behaviour that occurs when learning takes place'. McDonald *et al*., (2005) on the other hand explains that, it is a theory of learning, which plays more emphasis on observable behaviours, and discounts any metal activity. In simple terms, the theory of behaviourism explains that learning has absolutely nothing to do with the human mind. This means that learning occurs with the acquisition of a new behaviour (Pritchard, 2014). Behaviourists, from their philosophical point of view, call this method

of learning '*conditioning*'. Experiments made by early behaviourists identify conditioning as the universal learning process, which is the foundation of the behaviourist theory.

2.9.1.2 Central notion of Behaviourism - Behaviourism focuses on the central notion of a reaction being made to a particular stimulus. This is a simple relationship that has mostly been used to describe learning situations that are more complex. At its lowest level, behaviour can be observed, which can be referred to as 'learnt behaviour', in a wide range of diverse situations. From this point of view, most behaviourists mostly rely on observable behaviour to learn.

They therefore do not highly focus their attention on the mental activities of the learners, because to them learning happens when certain conditions are met (Dewald, 1999). Many behaviourists believe that most form of learning comes from the observation of cultures (Plotkin, 2003), and these come from the environment in which we live. Supporters of this theory have the opinion that there must be some form of incentive to create certain responses among humans and this incentive they argue could be either positive or negative. If the incentive is positive then it may be rewarded and punished if negative (Lisa *et al*., 2003)

Several studies have shown that behaviourist methods of reinforcement are very effective in creating positive behaviour in almost any learning environment and such methods positively affect the performance among learners (Dawning et al., 2005). According to behaviourism, psychology is a science and the science of behaviour, as such, it has nothing to do with the science of the mind (Schweiso, 1999). In other words, behaviourism asserts that the mind does not help a learner acquire knowledge; rather it is the psychology of the environment, which a person lives (Leahey, 2000). Behaviourists assert that the main stimuli of behaviours come from the external environment rather than the internal, thus it is the situational interactions (external or environment), which have effect to the particular (learner) not the mind (Marrone, 1999).

The theory of behaviourism is in fact a simple theory with an extraordinary message: Animals can learn so why can't humans too? Humans are not better than animals

(Andrew *et al.*, 2006). According to Winkler (2003, p. 23), Watson a behavioural psychologist claims that, *"he could turn the creature into any type of specialist, might select a doctor, lawyer, artist…….even into beggar-man and thief."* So mankind can be remanufactured to behave properly. This can be achieved through fear, love, and anger and so on (Sarah, 2006).

> *"Under the realm of behaviourism the intellect, feelings, and emotions of a person's inner life are not observable or measurable and therefore not investigated. Thus, a behavioural educator would advocate that effective learning is best accomplished by a change on behaviour and relies heavily upon behavioural objectives to accomplish the teaching learning task."* (Birzer, 2004, p. 67).

As such, we learn from our interactions with our environment or surrounding. The process of learning occurs because our learning is associated with a condition and that condition is the environment. (Crow & Tian, 2006). We learn because we follow certain accepted universal laws of behaviour and discipline. *"Foolishness is bound up in the heart of a child; the rod of discipline will remove it far from him."* (Wegner, 2005, p. 18).

2.9.1.3 Behaviourism in 'school learning' and technology

The behaviourist view of the learner is largely as passive recipient of the learning experience. In this sense, many people would argue that behaviourism is more acutely described as a teaching theory rather than a learning theory. Indeed, much of Skinner's work was implicitly critical of classroom teaching techniques. Skinner was particularly frustrated with the time-lapse that normally exist between a student's response and feedback that a classroom teacher is able to provide. Skinner also bemoaned the infrequency of such reinforcement, and the lack of individual attention that could be given to students in large classes. As with many of the learning theories of the 20th century, behaviourism soon became the driving motivation for proposed reforms to the existing educational system (Selwyn, 2014).

As the 1950s progressed, many behaviourists began to advocate a system of teaching and learning that became known as '*programmed instructor'*. As Saettler (1990) describes, involves a 'curriculum that is programmed step by step in small units, focused on

immediately observable and measurable learning products'. Here, the link between technology and behaviourist theory were made explicit. In particularly, the programmed instruction movement was built around the development and use of a number of educational technologies and 'mechanical devices'.

Early instances of programmed instructions techniques included mechanical multiple-choice machines and so-called chemo-sheets where learners were required to check their answers with chemical-dipped swabs. Skinner himself devoted much time to the development of the 'teaching machines'. Based on the principle of operant conditioning these machines required the learner to complete or answer a question and then receive feedback on the correctness of the response (Selwyn, 2014). Skinner's approach to the design of the teaching machines was to divide the learning process into a large number of very small steps, with positive reinforcement dependent upon the successful accomplishment of each step.

By relying on a series of small learning steps, the teaching machines were designed to give frequent positive reinforcement to increase the rate at which the learner correctly learnt each step. The teaching machines also operated on the condition that students should compose their responses themselves rather than select response from a set of prewritten multiple-choice options- skinner's reason being that responses should be recalled rather than recognized. Unlike conventional classroom-based learning, teaching machines were designed to keep students continuously and actively engaged with learning task, with immediate feedback provided on every response (Selwyn 2014). These teaching machines are technologies, which are seen to be reinforcing teaching and learning activities.

Teaching machines were generally considered at that time to be a success. Soon after developing the first machines for use in schools and universities, skinner reflected that 'with the help of teaching machines and programmed instructions, students could learn twice as much in the same time and with the same effort as in a standard classroom'. Although, the popularity of programmed instructions began to wane in the 1960s, its basic structure and behaviourist approach played an important role in the then emerging field of 'computer-assisted instructions'. Early forms of computer-assisted instructions

borrowed heavily from behaviourist principle- especially in terms of the drill-and-practice computer programs. Drill-and-practice software continues to be used into 2010s-most commonly designed to reinforce basic skills such as spelling words, development of reading vocabulary or typing programs.

Behaviourist principles also inform 'tutorial' software packages which present new concepts and provide step-by-step instructions on how to complete certain objectives. In all these cases, behaviourist-learning theory continues to underpin the design and development of educational technology, made decades on from the first teaching machines.

2.9.1.4 Criticisms of the behaviourist theory

Even though this theory received relevance in the classroom learning, it has received criticism regarding its practices. Regarding the 'drill-and practice' software and other applications, which were designed, based the behaviourist theory, there have been a lot of criticisms and in many cases this has been equally justified. Kuiper and de Pater-Sneep (2014) argued that such applications and software most often lack the major characteristics associated with the use of educational technologies such as authenticity and interactivity. Adding to that, Alessi and Trollip (2001) argue that drills do not capitalize on the power of the computer, as such; development of such software can easily be made without computers.

In recent times, even though the pedagogically unpopular software 'drill-and-practice' reinforces basic skills like spelling words when well designed and of high educational quality, the development of reading vocabulary remains useful in this particular type of learning and specific skills. As Jonassen (2000) argued, to enable complex learning and higher order skills, it is necessary for the learner at the beginning, to be able to perform the lower level *sub-skills* automatically. Using the 'drill-and-practice' software applications to learn these sub-skills helps to the learner to develop *automacity*. Nevertheless, the 'drill-and-practice' software application does not facilitate the transfer of those skills to meaningful purpose.

In its most extreme form, behaviourism appears not to involve with internal cognitive

processes such as reasoning about the consequences of consistently performing an action (Bartlett *et al.*, 2001). Chomsky (2001) argued that the principles of behaviourism failed to explain complex human behaviour such as language and communication. Similarly, researchers (Alessi & Trollip, 2001) argue that the principles of behaviourism do not predict all learning outcomes. Extreme behaviourism focused on observable stimulus conditions and the behaviours associated with those conditions and as a result, it was difficult to study phenomena such as understanding, reasoning and thinking. Over time, a more "moderate" form of behaviourism replaced this extreme behaviourism.

This latter form, although "preserved the scientific rigor of using behaviour as data, it also allowed hypotheses about internal mental states when these became necessary to explain various phenomena" (Bransford, 2000). Recent criticism has focused on the Instructional System Design (ISD) models as they are largely based on behaviourism. Instructional System Design was an approach to the development of instruction, initially in industry and the military where there was a need of developing a great amount of effective instruction that would promote mastery learning (Alessi & Trollip, 2001).

Accordingly, its focus was towards the teaching of adults rather than to primary or secondary education. ISD models are considered to ignore important aspects of learning that could not be observed, such as thinking, reflection, memory and motivation. In addition, they emphasize too much on the instructor and instructional materials and at the same time, they do not emphasize enough on the learner (Alessi & Trollip, 2001). However, behavioural principles, such as positive reinforcement and corrective feedback, are appropriate to apply in a number of computer educational environments (Alessi & Trollip, 2001).

In conclusion, Behaviourism's theory of positive reinforcement (rewards) deals with the concept of motivation. Its theory of negative reinforcement technique is equally important as prevention. This theory is a traditional way of teaching and reflects the views of teachers who believe in the concept of rewards and punishments as the only means of education. Having acknowledged the importance of this theory to the body of existing knowledge, recent findings indicate that behaviourism has staggered too many

critical difficulties with some of its very own promises. To date, behaviourism is very much detested. It has lost its might and authority to other renowned theorists such as Bruner's constructivism methodology.

2.9.2 Constructivism theory of teaching and learning

The theory of constructivism becomes very relevant by highlighting the critical ideas in education. With an effort to reform the educational systems, constructivism theory place more emphasis on student-centred learning where students are helped by teachers to gain an understanding of their activities and how they acquire knowledge. The theory was form the ideas of Piaget (1967), who argue that humans generate knowledge and meanings from their interaction between their experiences and ideas. In short, it is an interaction between experiences and behaviour patterns, which Piaget referred to as 'schemata'.

The central idea about constructivism is that learning among humans are 'constructed' that the individual learner develops new ideas upon the foundation of learning. According to Driscoll (2000), the theory of constructivism is a philosophical position that enhances' the logical and conceptual growth of students. Phillips (1995), reaffirmed by explaining that constructivism theory creates the teaching and learning environments that exposes the learner to the issues or materials being studied, hence there is the promotion of student learning.

Driscoll (2000), further added that constructivism exist within the human mind which helps them to constantly derive their own personal mental model of the real world from their respective views of that world. As these humans strongly perceive their new experiences, they continue to update their mental models to reflect their new knowledge, and therefore construct their own interpretation of reality. Jonassen (1994) agree by asserting that constructivism theory aids in tapping and triggering the innate curiosity of learners' to try and understand how the world functions. Oliver (2000), in his view noted that constructivism theory has had positive impact on teaching and learning methods in education and is an underlying theme of several educational reform movements.

2.9.2.1 Principles of Constructivist theory

Although there are variations in definition and degree, there are four generally agreed upon aspects of constructivist lessons. Good and Brophy (1994), pointed the following three main principles of constructivism:

Learners construct their own meaning - Students are not passive receptacles. They do not easily process or transfer what they passively receive. In order to make knowledge useful in a new situation, students must make a deliberate effort to make sense of the information that comes to them. They must own it. They must manipulate, discover, and create knowledge to fit their belief systems.

New learning builds on prior knowledge - In making an effort to make sense of information, students must make connections between old knowledge and new information. They must compare and question, challenge and investigate, accept or discard old information and beliefs in order to progress.

Learning is enhanced by social interaction - The constructivist process works best in social settings as students have the opportunity to compare and share their ideas with others. Learning occurs as students attempt to resolve conflicting ideas. Although social interaction is frequently accomplished in small group activities, discussions within the entire class provide students the opportunity to vocalize their knowledge and to learn from others.

2.9.2.2 Implications of technology for Constructivism theory

As these concepts suggest, constructivist accounts tend to support models of learning that are more activity based (Selwyn, 2014). These learning activities often take the form of problems that can be solved in many different ways according to an individual's approach. How individuals approach a learning experience will depend upon their existing knowledge and how they filter their current experiences through their previous experiences (Piaget, 1967). Attempts to encourage and support constructive learning seek to provide learners with opportunities to explore and learn through successful and

unsuccessful experiences. The role of the teacher is one of orchestrating and supporting the learner's exploration rather than directly providing instructions.

In this sense, technology is seen as a key means of facilitating a learner's exploration and construction of knowledge. The past 30 years have seen a growing belief among educationist that technology is one of the most suitable means of supporting constructivist principles in a learning environment (Selwyn, 2014). Constructionists therefore talk of encouraging a learner's conversations with an artefact, positioning the technologies as tools to learn *with*, rather than learn *from*. As Dawson (2008, p.34) states:

Digital technologies are able to support learners and allow them to engage in meaningful activities such as problem-based learning projects, browsing the Internet in search of information for a report, or the preparation of presentation assignments. Software and hardware become tools used by the student to create a product to be presented to teachers and fellow students so that they may review, learn, or critique in a collaborative manner.

2.9.2.3 Implication of Constructivism for teaching and learning

Central to the tenet of constructivism is that learning is an active process. Information may be imposed, but understanding cannot be, for it must come from within. Constructivism requires a teacher to act as a facilitator whose main function is to help students become active participants in their learning and make meaningful connections between prior knowledge, new knowledge, and the processes involved in learning. Hence, from a constructivist perspective, the primary responsibility of the teacher is to create and maintain a collaborative problem-solving environment, where students are allowed to construct their own knowledge, and the teacher acts as a facilitator and guide. Brooks and Brooks (1993, p.26) summarize a large segment of the literature to provide the following implication of constructivism for teaching and learning:

- Encourage and accept student autonomy and initiative;
- Use a wide variety of materials, including raw data, primary sources, and interactive materials and encourage students to use them

- Inquire about students' understandings of concepts before sharing his/her own understanding of those concepts
- Encourage students to engage in dialogue with the teacher and with one another
- Encourage student inquiry by asking thoughtful, open-ended questions and encourage students to ask questions to each other and seek elaboration of students‟ initial responses;
- Engage students in experiences that show contradictions to initial understandings and then encourage discussion
- Assess students' understanding through application and performance of open-structured tasks

2.10 Gaps and bias in the literature

The primary focus of this literature review is to report on current issues about educational technology. However, it would be incomplete if the researcher does not identify the gap in that particular area of research. There is some research areas for example studies illustrating how young learners use educational technology in which a lot of work has been done. There are other areas, such as the actual impact of educational technology on student's academic achievement where the researcher was unable to find any report. Some comments have been collated and given below.

2.10.1 Impact analyses of educational technology in the classroom

Research is needed on the impact of ICT in the classroom. This should include student perceptions of the use of ICT, the effect on student performance, longitudinal studies tracking students with different learning histories, impact on future behaviour in the workplace, comparative studies between groups using ICT and those who do not. There are also methodological issues as there are no tools specifically designed to measure the impact of e-learning and these need developing.

2.12.2 No systematic evaluation studies

There needs to be more and better evaluation of specific projects and initiatives and also research into the tools available for the evaluation of *e*-learning. Different evaluation

approaches and perspectives need to be explored for their applicability to e-learning and evaluation criteria developed. Further research is needed on how the outcomes of evaluation studies and impact analyses are fed back into teacher training.

2.10.3 Links between theory and practice

There is research into the theory and pedagogy of using educational technology in learning (albeit not a rich area) and research into the practice presented, for example, in case studies, handbooks. The big gap is in research which links the two together - in particular research looking at how observations of practice have generated new theoretical models and how pedagogic theory has directly impacted on classroom practice.

2.10.4 Management of change

There is little research into the heuristics, models and route maps appropriate for effecting institutional change in the use of educational technology and how these impact on staff development. There are some case studies around best practice in continuing professional development but many are not contextualized against particular models of institutional installation, adoption and use of educational technology.

2.10.5 Personas, demographics and dispositions

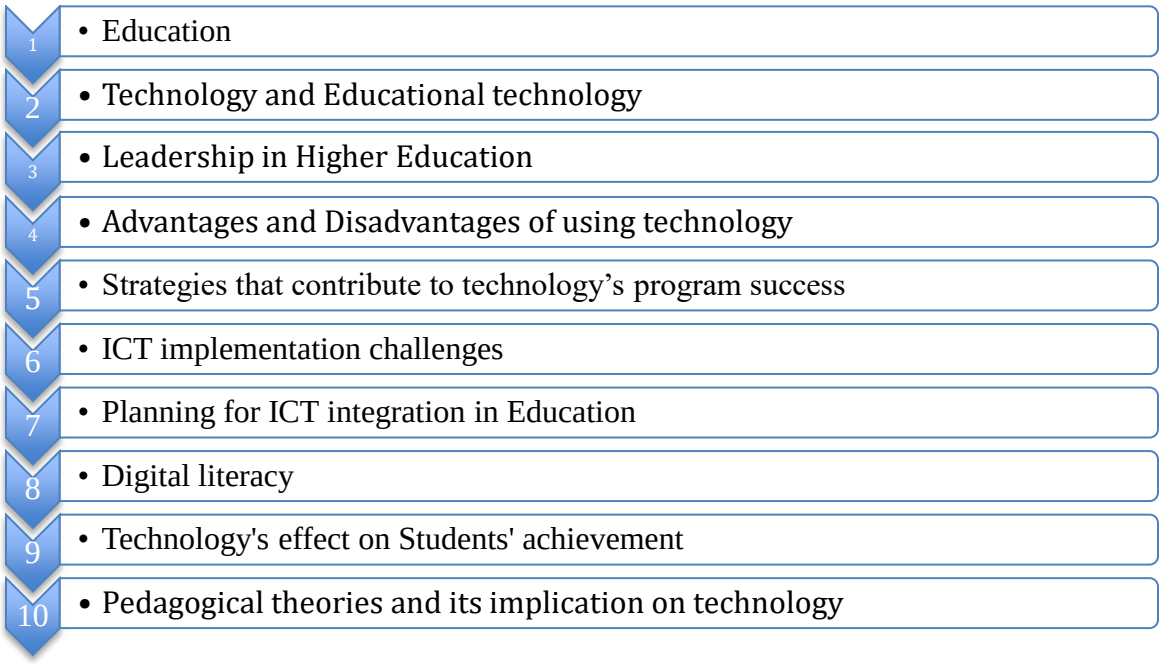
Existing research indicates that different teachers will have different ICT related learning needs and training should be individualized. That is, in terms of training needs, one size does not fit all – but what are the sizes? Can all these differences be realistically accommodated, especially on teacher training courses or can different 'personas' or 'dispositions' be identified and generalized? Do particular demographic groups have similar needs? What factors are most significant in accounting for the differences - such as previous learning histories, attitude to technology, pedagogic approaches, and prior exposure to technology in their professional and personal life?

2.11 Conclusion and development of themes

This chapter provided the opportunity for the researcher to review several existing literature on educational technology and other related factors that enables the smooth

implementation of ICT in education, as well as the challenges that are been faced by university authorities in their quest to incorporate ICT into classroom activities. There were a lot of factors that were revealed by the researcher, however there were particular factors that were prevalent in the field of educational technology and matching the aims and objectives of the study. There were ten central themes that were discovered to form a basis of a theoretical starting point that guided the study.

Figure 2.2: Development of research themes



Chapter 3 - Conceptual Framework for EduTech

3.1 Introduction

The main aim of this chapter is to develop and present a conceptual framework for the understanding of the factors that ought to be taken into consideration for effective use of educational technologies for teaching and learning in H.E.

The researcher under this investigation pulled together a strong overview about educational technology and the findings of the review shows why the topic continue to gain insight for further research. The overall background of the topic area provided the knowledge to develop a conceptual framework, which could help for effective implementation and the use of educational technologies for teaching and learning in higher education. It could be recalled from chapter two that most researchers focused mainly on the internal approach- thus concentrating on how factors within the higher education institution encourages or hinders the use of educational technologies in the classroom. This means that there is little systematic understanding and knowledge of other factors, which are external to the universities, and how these external factors are effectively combined with the internal factors to shape and encourage the use of educational technologies in higher education. Therefore the objectives of this chapter are as follows:

- To explain the element that constitutes the ***internal*** and ***external*** approach to this framework
- Summary of the conceptual framework
- To give policy and practical value of the conceptual framework

3.2 Construction of the conceptual framework

The conceptual framework presented in this chapter provides the avenue for investigating all factors external and internal to higher education institutions that promotes or hinders the use of educational technologies in teaching and learning. This framework was

constructed on the researcher's subjective understanding and interpretations of the factors that surfaced from a purposeful literature review on the internal and external environments of the higher education systems.

The *external* environment consists of four factors: government policies (such as funding and peace & security), industry demand on higher education, technology advancement as an influence, and demand for access to education. Conversely, the *internal* environment comprises of two major factors namely university leadership and faculty attitudes toward use of technology and academic culture. The university leadership has been further divided into two sub-factors, which are training and development or organizational support for technology use and availability of the technology itself. Each of these factors as reviewed already can directly or indirectly boost or hinder ICT use.

3.3 Significance of the conceptual framework

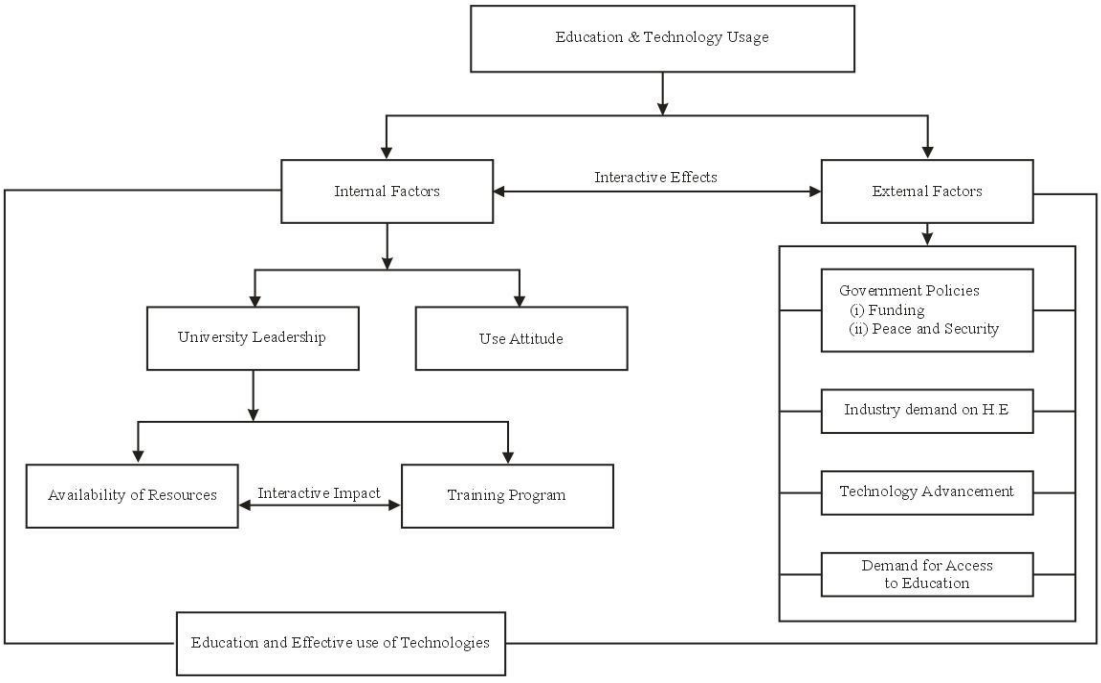
Information and communication technology (ICT) has eventually gained relevance around the globe and is now used for teaching and learning in universities worldwide (Selwyn, 2014). However, as stated earlier, there is a dearth of research offering an organized understanding into both internal and external factors that facilitate or hinder the phenomenon because research investigations on the use of ICT in higher education mainly focus on factors within institutions. This is commonly referred to as the '*internalist approach'* (Bates, 2000; Cole, 2000; Ransom *et al*., 2007; Price & Oliver, 2007).

Teaching and learning via the use of technologies has become a social and organizational phenomenon leading to theories suggesting that research studies attempting to offer vigorous and comprehensive understanding of phenomena tend to seek clarification of the links between micro and macro levels of factors. This is because '*institutional or structural features of society are intimately interwoven with behaviour and activity*" (Layder, 1993, p.55). This implies that, in an attempt to comprehensively understand an organizational phenomenon like ours (the use of ICT in teaching and learning), the influence of relevant factors at the individual, organizational, and societal levels should

be considered (Katz & Kahn, 1966). In consonance, this approach in particular is strongly supported in higher education research (Becher & Kogan, 1992; Clark, 1983). While observing faculty attitudes and values, Becher and Kogan (1992, p. 117) state that "*academics are amenable to outside influences impinging on their beliefs and values in the normative mode and conditioning their activities and practices in the operational mode. The normative dimension includes professional norms as well as social, economic, and cultural forces*".

Hence, any proper investigative framework for analysing the use of technologies for teaching and learning must take into consideration, the impact of internal and external factors on universities so far as faculty beliefs, values and occupational practices are predisposed to societal influences as claimed by Becher and Kogan (1992). Figure 3.2 below illustrates the proposed framework. The following sections provide an in-depth discussion about the *internal* and *external* approach.

Figure 3.2 Conceptual Framework on the use of EduTech in H.E



Source: Research findings, 2017

3.4 Internal factors of the conceptual framework

This part of the framework shows the factors, which are internal to the university that aids in effective use of educational technologies for teaching and learning. The literature highlighted two main factors, which are key elements of the internal structure of the university, namely (i) university leadership, and (ii) User attitudes. Having the major role of supervising the activities of the university, the leadership factor also has two sub-factors namely (i) availability of technological resources and infrastructure and (ii) Training and development programs (Bates, 2000; Becher, 1989; Becher & Kogan, 1992; Clark, 1983). These will be analysed in the context of their influence in subsequent paragraphs and developed to construct the internal factor of the conceptual framework presented later in the chapter.

3.4.1 University leadership

Fusing ICT into the educational system is mostly deemed as a complex novelty for universities mainly because of the loosely defined nature of university structure and the tradition of faculty autonomy. One of the most important roles of university leadership is to create an enabling environment and good policy framework for effective integration of ICT in education as highlighted in the available literature (Bates, 2000).

However, leadership is obviously not restricted to organizing and harnessing human and additional internal resources needed to expedite ICT use in teaching. It also requires critically observing and examining the external factors of the university in order to secure suitable resources from it, and manage the frontier known as organizational boundary where the university and its environment meet (Selwyn, 2014). In providing an enabling environment, the university leadership owe it a responsibility to provide educational technologies and its associated infrastructure as well as provide training and development programs to equip teachers and students with the required technical knowhow. These sub-factors have been explained in the section below.

3.4.1.1 Availability of Technological resources and infrastructure

University leadership obligatorily facilitates incorporating technology in education.

Successes chalked by institutions into pairing ICT with education is normally reached by ascribing the whole process of technology-integration to selected divisions and offices, as part of their efforts to endorse, diffuse and institutionalize technology use. Case studies reveal the accessibility of ICT infrastructure, faculty development, and student-aid facilities as key into understanding technology use in education, including the structural and cultural changes incited by its use (Bates, 2007; Dabbagh & Bannan-Ritland, 2005).

Moving on, as observed by Kelly (2007), tutors need to be helped in acquiring the appropriate technological and instructional design skills to aid teaching with ICT. As universities try hard to convince faculty to adopt ICT, they face a difficulty of faculty workload and incentive they must address. However, the more faculty and students are provided the needed technologies, the greater the chances of integrating ICT in instructional delivery (Bates, 2007).

3.4.1.2 Training and development programs

The leadership of the university needs to put together various policies and organizational systems and practices that could possibly influence the performance and attitude of its stakeholders (Bergquist & Pawlak, 2008). These policies and practices are very vital in motivating and retaining students and teachers in their respective activities. Training and development programs have becomes one of the most important elements in managing human resources in an organization (Kuh & Whitt, 2013). In this case, for proper management of teachers and students at various higher educations, it is important to offer training and other related workshops on the effective use of any new technology so as to equip them with the necessary and sufficient skills to fully adopt educational technology where appropriate.

For effective implementation of ICT into any classroom curriculum, there must be planned efforts by the authorities of the higher education to facilitate teachers and students competencies (Clark, 1983). These competencies include knowledge, skills, or behaviours that are critical for successful use of educational technologies. The goal of the training that ought to be provided by the universities is to help students and teachers master the knowledge, skill, and behaviours associated in using technologies and to apply them to their day-to-day activities (Dabbagh & Bannan-Ritland, 2005). Moreover, for a

university to gain a competitive advantage and effectively implement technology usage, its training has to involve more than just basic skill development (Bates, 2000). That is, to use training to gain a competitive advantage, a university should view training broadly as a way to create intellectual capital (Lewis *et al*., 2005). Intellectual capital includes basic skills (skills needed to perform teaching activities), advanced skills (such as how to use technology to share information with other teachers), an understanding of the technology in question, and self-motivated creativity

3.4.2 User attitude

Most often than not, the effective implementation of ICT into educational curriculum creates several conflicts for users who possess a negative attitude towards the use of any given ICT as an academic enabling tool (Mumtaz, 2000). Students and teachers negative attitude towards effective use of ICT have been associated to the lack of confidence due to inadequate training opportunities being provided (Haydn and Barton, 2007; BECTA, 2004). To highly understand various attitudes and their overall effect on students and teachers is it important to fully understand that 'concerns' form a major part of attitudes. Concerns could be fully understand to entail users' perception, attitudes, motivations and feelings that are attached and experience when planning to integrate any innovation, which in this case 'educational technology integration' (Haydn and Barton, 2007).

Findings from the research conducted by Haydn and Barton (200) & Mumtaz (2000) explains that before and during the implementation of any new technology into education, teachers and students systematically go through a series of psychological stages which takes into consideration their various concerns towards the new technology. Teachers and students' concerns about the use of educational technology could be put into three phases, the first phase concerns the self, the second phase concerns effective management and implementation of task by the use of technology, the third phase is related to the overall impact of technology on teaching and learning activities (Haydn and Barton, 2007). The current consensus is that the timely identification of teachers' and students 'concerns is a crucial task if technology integration is to be successful in the classroom (BECTA, 2004).

3.5 External factors of the conceptual framework

Unlike the internal factors, all those elements, which are outside the university but have significant influence on the policies and practices with regards to the implementation of technology into the higher education, are classified as an *external factor*. Therefore this section intends to review literature regarding the external setting of higher education to identify the external factors that could possibly influence the use of ICT in teaching and learning in universities in order to conceptualize the external elements of the proposed framework for effective research presented in this thesis

Social and organizational theories such as open systems (Katz & Kahn, 1966), contingency (Lawrence & Lorsch, 1967), ecological (Hannan & Freeman, 1977; Aldrich, 1979), and institutional (Meyer & Scott, 1992) for instance lay emphasize on the liaison between many higher education institutions and their external environs. Just like any other organization, institutions of higher learning are at the mercy of the shaping influence of elements in their settings. Various literature reviews for example (Blackman & Segal, 1992; Neave & Vught, 1994; WGDOL, 2003, 2002) pointed the following significant elements in the external environment of universities: government policies, industry demand of university, technology advancement and demand for access to H.E

3.5.1 Government as an influence on the university

Education is ubiquitously a governmental responsibility. Government is a decisive constituent in the political economic analysis of education because, as "power is expressed at least in part through a society's political system … *any political economy model of educational change has behind it a carefully thought out theory of the functioning of government*" (p. 157). As such, no study of the educational structure can be separated from the explicit or implicit analysis of the government sector (Carnoy, 1985, p. 157).

Across the world, there are traces of direct and indirect governmental interferences or engagements in universities and does not matter even if these countries are developed or underdeveloped, dictatorial or democratic (Altbach, 1990). In ascertaining the reasons for

the interferences a review of the literature points out to a prioritized interest in knowledge and skills as critical national developmental issues. Teichler (1991, p. 45) argue that government interventions in higher institutions of learning, "may have been inevitable given the growing importance of systematic knowledge for economic growth, for social problem-solving and for the growing training function of higher education".

Government intervention in education and universities usually come masked as an instrument popularly referred to as "public policy." Due to the general and major economic problem of tenacious scarcity of resources and conflict of interests, governments directly or indirectly mediates on behalf of its citizens to control, allocate, and redistribute educational opportunities and services; to make the most of universities; and to provide a decent and safe atmosphere for conducting research, civil service, as well as teaching and learning. According to Adam (2003), the prime role of government in promoting the use of ICT in universities is as follows: "*A well-articulated, networked learning environment in higher education requires significant government intervention. Government policy has a real impact on strategic initiatives in universities and often determines the parameters of such initiatives through laws, regulations, and the allocation of funds*" (p. 219). Section 3.5.1.1-2 below briefly explains two main government roles in ensuring safety environments and providing funds to support higher education.

3.5.1.1 Peace and security of a country or location

Blattman & Miguel (2010) explained that peace is a social and political condition that ensures development of individuals and the society at large. Collier (2009) further added that peace is a state of harmony characterized by the existence of healthy relationships. Stiglitz *et al*., (2010) asserts that security is the safety of an individual, an institution, a region, a nation or the world. Combined together, it is a condition where individuals, institutions, regions, nations and the world move ahead without any threat. Conflict not only generates threat and fear, but also hampers economic, social, or political advancement.

There is a mutual relationship between peace and security and educational development. In the absence of peace and security, educational activities cannot function and development cannot take place: Peace is still more essential for development in various areas. No development activity is possible if there is disturbance, violence or war (Inge *et al*., 1999). One can argue that effective educational programs are enhanced if peace and security is prevalent in all the areas that constitute that region. It is through peace and security that nations can ensure social and economic progress for the people and improves their quality of life through education (World Bank, 2011). This ensures that people do not suffer from a sense of deprivation, which leads them to indulge in protests and violent activities. Development initiatives contribute to sustain peace, security and stability in the countries. The government of any country owes it a major role in ensuring the safety of its populace in order to allow educational activities to take place.

3.5.1.2 Funding as an influence on the university

Governments utilize a variety of funding opportunities as an instrument for steering both public and private universities. The use of funding to influence universities is generally seen as a very potent tactic and strategy. Neave and Vught (1994) observe that "in any higher education the budgetary process is a powerful instrument in determining institutional behaviour" (p. 312), and Becher and Kogan (1992) state that "resource allocations are a metaphor for allocation of values" (p. 83). Funding from government is understandably a major factor for government-sponsored institutions, and can also be a significant factor for private institutions to the extent that they receive research or special purpose grants from government or government-funded agencies.

Industry is identified in the literature as a source of funding for universities (Buchbinder, 1993). The goal of improving funding in the face of inadequate financial support from traditional funding sources contributes in motivating universities to partner with industry. The pressure of rising student enrolment and the rising costs of running modern libraries, and of installing and maintaining modern laboratories and technology impel universities to look to industry for funding. Funding is also implicated in demand for access since increased enrolments can result in universities recording more revenue from tuition payments.

3.5.2 Industry as an influence on the university

Industry somehow influences the structures and agendas of universities, as well as their values (Blackman & Segal, 1992; Buchbinder, 1993). Similar to the university-government relation, there exist a controversial relationship between university and industry due to its potential or real threat to traditional academic tenets and university autonomy.

The nature of modern economy provides the impetus for current university-industry relationships. It is a skill-based and technology intensive knowledge that makes investment in research and development, as well as in human capital vital. In this progressive world, governments must pledge to keep these vital resources up-to-date as knowledge and skills can grow obsolete. It is only rational that "firms should seek to establish enduring relationships with HE [higher education] and other institutions, to ensure that they have the knowledge base and more particularly the skill essential … for economic activities" (Blackman & Segal, 1992, p. 936).

The need to complement funding from government or traditional sources amid myriads of reasons inspires universities to partner with industry (Michael & Holdaway, 1992). Another incentive for partnering industry is for them to be exposed to an avant-garde theoretical and practical knowledge that may be available to industry. As Blackman and Segal (1992) for example puts it, industry may be way ahead of the university regarding "*theory and not just practice*" (p. 936). Moreover, university-industry relation offers opportunities for university faculty and students alike to acquaint themselves with advanced industrial science and technology, as well as modern management systems and practices. In reciprocating, universities uphold collaborating with industry in order to boost employment opportunities for students by tailoring their programs and courses to address the needs of industry.

3.5.3 Information technology as an influence on the university

The key element stimulating an informational revolution in modern society is Information and Communication Technology (ICT). Teaching and learning in universities nowadays makes use of ICT to facilitate time and place independent access,

enhance quality, and reduce costs (Price & Oliver, 2007; WGDOL, 2003). ICT has according to Martin (1988) become a change agent and that "no field of human endeavour remains immune to its influence, no corner of life is left undisturbed by its coming" (p. 11). Although the use of ICT in education is relishing a strong global interest, some of its critics question this whole concept of technology as a "magic bullet" for addressing the concerns about access, quality, and cost.

Activists for the use of ICT in education have a firm conviction that technology in education supports time and place independent educational transactions and these could be harnessed to enhance greater access (Pargman *et al*., 2018). However, critics decry such claims, which tend to suggest that ICT expands access to education at the higher levels. Some of these critics further caution how ICT affordability and possession of appropriate skills could pose a limitation to access (Bates, 2000). The extent ICT goes into significantly supporting a variety of educational influences is however, hardly questioned.

It is often argued that ICT plays a key role in enhancing quality of education (Beers, 2007; Dabbagh & Bannan-Ritland, 2005; Epper & Bates, 2001). For instance, by the use of the Internet alone, one is exposed to a great deal of learning materials the world over. The use of e-mail supports time and place independent teacher-student and/or student-student communication. Furthermore, students could take advantage of one-to-one, one-to-many, and many-to-many computer conferencing tools for personal or group learning. In addition, ICT may enhance quality on the basis of what can be referred to as the synchrony thesis. This model implies that by incorporating the use of ICT into the teaching and learning process, the gap between industry and education is bridged as learners are privileged to acquaint themselves with one of the key global tools used in the world of work (Sun *et al*., 2018; Northey *et al*., 2018).

Critics contest the quality-enhancing justifications on two major grounds: that communication through technology lacks any authentic human contact and that the view of an education-economy synchrony is driven more by economic exploitation (Mackay, 1991). In the former, these critics argue that technology cannot aid at first hand rich human interactions for a meaningful learning experience (Brabazon, 2002; Noble, 1998;

Postman, 1992; Weizenbaum, 1976).

Another basis for using ICT in the teaching and learning process is its associating cost-reduction probability which most people will be keen on. Cohorts of this claim believe that the ability technology possesses into supporting disseminated learning allows for the realization of educational benefits that can ensue from economies of scale supposing it relates to a huge number of learners. Moreover, technology use in schools may save travel time and other operational costs for instructors and students alike. The cost-reduction potential is often presented with caveats that sound problematic, an example being that there has to be sizeable retrenchment of labour to prompt a significant cut to cost (Massey & Zemsky, 1995). Daniel (1997) expresses this cost-reduction feature in a provision that entails important organizational and process restructuring: "*technology can raise productivity, but only through a reorganization of the teaching-learning process based on the development of a technology infrastructure*" (p. 16). Yet, the use of ICT for teaching and learning at the universities is ever-increasing adamantly, putting pressure on institutions to restructure and reinvent themselves in ways that would allow for optimum realization of its capabilities.

3.5.4 Demand for Access as an influence on the university

Demand for access to higher education, which has been growing since World War II has shaped and continues to shape universities. There is hardly any attempt to account for increasing demand for access that does not significantly attribute the trend to the roles education plays in modern society. Education plays critical roles in economic productivity (Denison, 1962; Schultz, 1961), and in social selection or mobility (Dore, 1976). The value of education goes beyond the instrumental. Modern society has institutionalized education as a citizenship right, as a social virtue, as a public good, and as a stratification process; thus, providing individuals incentives to participate (Carnoy, 1985; Meyer, 1992).

Universities are under pressure to make institutional changes in order to meaningfully respond to the needs of a heterogeneous mass clientele seeking flexible and convenient arrangements. The key changes occurring in universities in response to mass or flexible

demand for access include use of ICT for on-campus and distance education (Bates, 2000).

3.6 Policy and practical value

The framework of both the external and internal factors could lead research into reaching outcomes with policy and practical consequences for technology use in universities. Subsequent studies can operationalize both factors of the framework to scientifically analyse the following: kinds of technology available in the area a university is located; demand for on-campus and distance access; how or why a university make the most of ICT in response to demand for access; national ICT policy, exclusively as it relates to education; private sector or industry funding for ICT in education; government funding initiatives for use of ICT in education; university leadership's ICT fund-raising efforts; leadership's technology, structural, and administrative initiatives to encourage use of ICT, kinds of ICT used in higher education institutions and scope of technology use. Others also include faculty opinions and stances toward ICT use in education, how corrective measures and code of ethics augment or hinder ICT use, faculty development ingenuities linked to ICT use; and other varieties of support universities table down in support of ICT use by faculty and students alike.

3.7 Conclusion

This chapter, guided by the external-internal approach to social and organizational research, presented a conceptual framework for implementing technologies at higher education in developing countries. This framework is intended to focus research on the external and internal factors motivating and influencing use of technology in education. Scientifically tested facts of societal and organizational nature of ICT are a basic means for designing, effecting, and assessing ICT initiatives. Both internal and external factors of the framework can help shape ICT policies in higher education at system levels, as well as policy and operational instruments within different universities.

Chapter 4.0: Research Context (Ghana)

4.1 Introduction

This chapter gives the introduction to the Country where the case study for this study was selected. To start with, the country profile is given followed by educational system and its reforms. The third section illustrates the current educational system of Ghana followed by a brief overview of the entire selected case study universities understudy. All information about Ghana under this chapter was retrieved from the official website of Ministry of education in Ghana. This is the government official mouthpiece, which publishes the profiles about the country's educational system and other information.

4.2 Country Profile

Ghana was formed from the extensive merger of the British colony of the Gold Coast and the Togoland trust territory. It is located in the West African region, flanked by Ivory Coast on the western side, Togo to the eastern side, Burkina Faso to the north and the southern side by the Gulf of Guinea. As shown in figure 4.1 below, Ghana became the first country in the sub-Saharan region in colonial Africa to gain its independence from the British colonial rule in 1957. Having been divided into ten regions, Ghana has Accra as its capital city. The official language of Ghana is English and Akan (thus, Twi and Fante as the second most spoken language), and more than 10 other languages.

Ghana occupies an area of 238 540 km^2 according to the United Nations Statistics Division and has a population of 28 million inhabitants and extensively divided into more than 75 ethnic groups (Ghana Statistical Service, 2016). Ghana is considered one of the more stable countries in West Africa. The nation maintains a constitutional presidential multiparty democracy. The government exercises executive power. Legislative power is vested in both the government and Parliament.

Figure 4.1: Political Map of Ghana

Source: CIA fact book, 2013

4.3 Education in Ghana

Education in Ghana was mainly informal, and based on apprenticeship before the arrival of European settlers, who built a formal education system addressed to the elites. With the independence of Ghana in 1957, universal education became an important political objective. The magnitude of the task as well as economic difficulties and political instabilities has slowed down attempted reforms. The Education Act in 1987, followed by the Constitution of 1992, gave a new impulse to educational policies in the country. In 2011, the primary school net enrolment rate was 84%, described by UNICEF as "far ahead" of the Sub-Saharan average. In its 2013-14 report, the World Economic Forum ranked Ghana 46th out of 148 countries for education system quality.

In 2010, Ghana's literacy rate was 71.5%, with a notable gap between men (78.3%) and women (65.3%). The guardian newspaper disclosed in April 2015 that 90% of children in Ghana were enrolled in school, ahead of countries like Pakistan and Nigeria at 72% and 64% respectively.

Education indicators in Ghana reflect a gender gap and disparities between rural and urban areas, as well as between southern and northern parts of the country. Those disparities drive public action against illiteracy and inequities in access to education. Eliminating illiteracy has been a constant objective of Ghanaian education policies for the last 40 years; the difficulties around ensuring equitable access to education are likewise acknowledged by the authorities. Public action in both domains has yielded results judged significant but not sufficient by national experts and international organizations. Increasing the place of vocational education and training and of ICT (information and communications technology) within the education system are other clear objectives of Ghanaian policies in education. The impact of public action remains hard to assess in these fields due to recent implementation or lack of data.

The Ministry of Education is responsible for the administration and the coordination of public action regarding Education. Its multiple agencies handle the concrete implementation of policies, in cooperation with the local authorities (10 regional and 138 district offices). The State also manages the training of teachers. Many private and public

colleges prepare applicants to pass the teacher certification exam to teach at the primary level. Two universities offer special curricula leading to secondary education teacher certification. Education represented 23% of the state expenditure in 2010; international donor support to the sector has steadily declined as the State has taken on the bulk of education funding

Education in Ghana is divided into three phases: basic education (kindergarten, primary school, and lower secondary school), secondary education (upper secondary school, technical and vocational education) and tertiary education (universities, polytechnics and colleges). Education is compulsory between the ages of four and 15 (basic education). The language of instruction is mainly English. The academic year usually runs from August to May inclusive.

4.4 Structure of formal Education

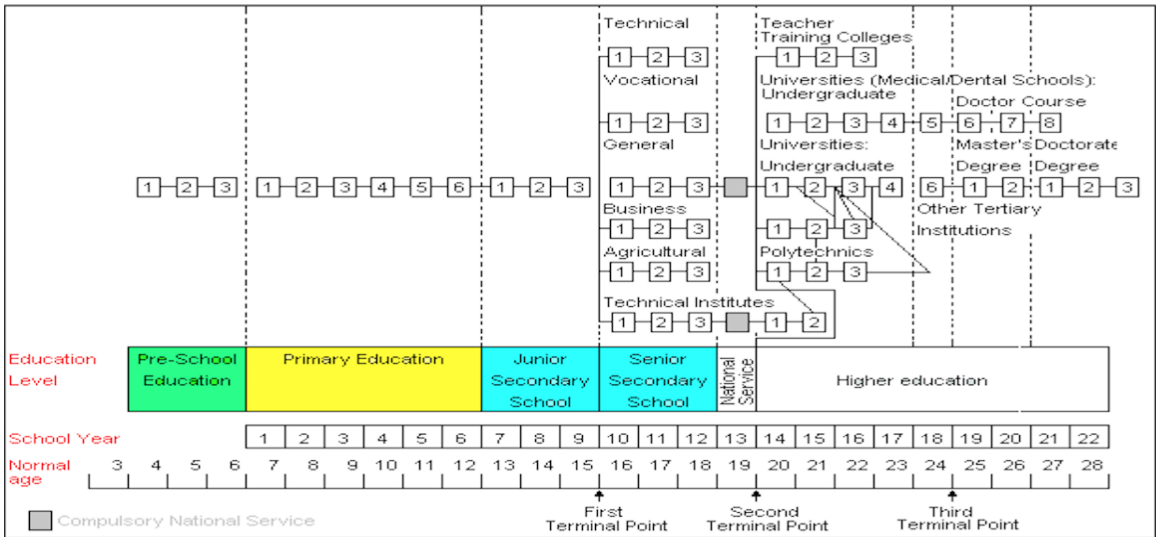
Ghanaian education system is divided in three parts: "Basic Education", secondary cycle and tertiary Education. "Basic Education" lasts 11 years (Age 4-15), is free and compulsory (Ghana Education Service, 2014). It is divided into Kindergarten (2 years), primary school (2 modules of 3 years) and Junior High school (3 years). The junior high school (JHS) ends on the Basic Education Certificate Examination (BECE) (Ghana Education Service, 2014). Once the BECE achieved, the pupil can pursue into secondary cycle (Ghana Education Service, 2014). Secondary cycle can be either general (assumed by Senior High School) or vocational (assumed by technical Senior High School, Technical and vocational Institutes and a massive private and informal offer). Senior High school lasts three years and ends on the West African Secondary School Certificate Examination (WASSCE).

Tertiary education is basically divided into university (academic education) and Polytechnics (vocational education). This is shown in figured 4.2 below. According to the National Accreditation Board (2018), the number of accredited tertiary institutions in Ghana per category is 214. Only 10 out of the 210 tertiary institutions in Ghana are public universities. These tertiary institutions are assessed by the National Accreditation

Board before been given the permission to offer any higher educational activities to students from various parts of the country. Out of a total of 10 public universities in Ghana, this research study engaged participants from only 4 universities across the country.

The WASSCE is needed to join a university bachelor's degree program (Ghana Education Service, 2014). A bachelor's degree lasts 4 years and can be followed by a 1 or 2 year Master. The student is then free to start a PhD, usually completed in 3 years (Ghana Education Service, 2014). Polytechnics are opened to vocational students, from SHS or from TVI (Ghana Education Service, 2014). A Polytechnic curriculum lasts 2 to 3 years (Ghana Education Service, 2014). Ghana also possesses numerous colleges of education (Ghana Education Service, 2014). New tertiary education graduates have to serve one year within the National Service Scheme (Ghana Education Service, 2014). The Ghanaian education system from Kindergarten up to an undergraduate degree level takes 20 years (Ghana Education Service, 2014). The academic year usually goes from August to May inclusive (Ghana Education Service, 2014). The school year lasts 40 weeks in Primary school and SHS, and 45 weeks in JHS (Ghana Education Service, 2014).

Figure 4.2: structure of formal education in Ghana



Source: Ghana Education Service, 2012

4.5 Overview of Research Case Studies

The adoption of research case study was presented and justified in chapter 5 of this study. This section aims to briefly present the background of each individual case study selected for this study. The researcher therefore introduces four individual case studies selected from higher education institutions in Ghana- University of Cape Coast (UCC), University of Ghana (UG), University of Professional Studies (UPS) and Kwame Nkrumah University of Science and Technology (KNUST). The background information of these four case studies were gathered from the official website of each university.

4.5.1 Case Study One (University of Cape Coast (UCC)

The University of Cape Coast (UCC) is one of the rare sea front universities in the world established in October 1962 as a University College but attained the status of a full and independent university in 1971 with the authority to award its own degrees. As its name goes, it is located some 5 km west of Cape Coast in the Central Region of Ghana. UCC sits on a hill overlooking the Atlantic Ocean. It was established mainly to focus on training highly qualified and skilled manpower (graduate professional teachers) to meet an urgent need to the nation's accelerated educational agenda at the time but has progressively added to its core mandate by training experts in other unrelated disciplines such as agriculture and information technology. UCC is a public university. From an initial student enrolment of 155 in 1963, estimated student population today is over 35000 made up of undergraduate, postgraduate, sandwich and distant learning students all combined.

- **ICT Infrastructure**

Advances in ICT in recent years has made information much more handy and available in numerous forms through various means. Information acquisition, design, manipulation, transmission, storage, retrieval, management, preservation and usage have become paramount in our daily lives. The University of Cape Coast consequently has introduced courses and has invested in technology across campus to aid in inculcating ICT skills to its members. Lecture halls can boast of PA systems and projectors for presentation, internet is accessible at various points on campus for both tutors and students whiles

various ICT centres, printing houses and internet cafés are positioned in several other locations on campus.

4.5.2 Case Study Two: University of Ghana (UG)

The University of Ghana (UG) is widely touted as the nation's premier university located at Legon, about 12 km from Accra, the nation's capital. It is the oldest and largest among all the universities in Ghana. It is also a public university established in 1948 as the University College of the Gold Coast with close to about 40,000-student population coming from all over the world and staff strength of about 4000. It was originally established to focus or emphasize on liberal arts, social sciences, basic science, agriculture and medicine. The university covers a land size of about 99 hectares. UG is ranked number one amongst institutions of higher education in West Africa and in the top 10 universities in the whole of Africa according to the Times Higher Education rankings of 2016.

- **ICT Infrastructure**

The University of Ghana has adopted strategies and put in place a larger set of activities to show its strong desire of using ICT as a key means of achieving its future goals and aspiration of becoming a research-led flagship university. As such, it organises periodic workshops and ICT training for its staff. It also recently inaugurated a distance education ICT project to help ease the pressure on its facilities, most especially the lecture halls. Similar to KNUST, there are also various hotspots across campus to access the Internet. There is also a common system called the Module through which teachers interact with students for academic purposes and assignments. Most lecture halls also do come with PA systems and projectors to aid academic work.

4.5.3 Case Study Three: University of Professional Studies (UPS)

The University of Professional Studies, Accra (UPSA) started in 1965 as a private professional business school that was later on taken over by government in 1978 via the Institute of Professional Studies Decree. Currently, by means of the University of Professional Studies Act (2012), it has been transformed into a tertiary institution with a

core mandate of providing mostly higher professional education in the academic disciplines of Accountancy, Financial Management, Marketing and related fields. It has over the years carried out both academic and business professional education in Ghana. The University of Professional Studies, Accra (UPSA) formerly referred to as the Institute of Professional Studies (IPS) is located at Madina in the Greater Accra Region of Ghana, some ten minutes' drive from the University of Ghana (UG). The school has an estimated student population of over 11000.

- **ICT Infrastructure**

UPSA has a thoughtfully crafted strategic plan to project its image as a nationally entrenched, regionally relevant and globally recognised institution of higher education and research. Consequently, the school is not leaving out technology in its operations. To facilitate teaching and learning, UPSA is embracing ICT as in the other universities afore discussed above. Tutors and learners interact through a system known as the module where students could access information and assignments from their respective lecturers. Internet connectivity to support this system is somewhat readily available barring few challenges. PA systems, laptops as well as projectors are a common feature in the classroom. Periodic training for lecturers in the use of the Microsoft Office Suite and other commonly used software and systems on campus are organised to boost their technical knowhow. Accessibility to the net is also not a problem for students and lecturers alike.

4.5.4 Case Study Four: Kwame Nkrumah University of Science and Technology (KNUST)

Dr Kwame Nkrumah, the first president of Ghana, established the Kwame Nkrumah University of Science and Technology (KNUST) in 1952. It is a public university located about 7 km away from the central business city of Kumasi (capital of the Ashanti Region – the most populous region in Ghana; Ghana Statistical Service, 2010). It is the second largest university in Ghana. KNUST has a student population of over 42,000 students spread from across the globe, majority being undergraduate students and a staff strength of about 3400. The university covers a total land area of about 16 square-kilometres.

- **ICT Infrastructure**

In order to maintain its status as the premier science and technology institution of higher learning in not only Ghana but also West Africa, KNUST has over the years invested much into technology and can boast of complex ICT installations. It has for instance installed a number of ICT facilities and installations all over campus including an access to Wi-Fi connections in the lecture halls and halls of residence as well. As such, in the comfort of their rooms and in their various offices, students and lecturers respectively have access to the Internet. Basics in computer science are an obligatory course for almost all first year students for a full academic year. Moreover, ICT centres and Internet hotspots are widespread across campus. The school also boasts of the very first Tech Hub in the sub-region, digitised library and a fast speed Vodafone Internet Café. There is also a centre for business development that comes along with an ICT lab and an Internet café. The use of PA systems and projectors are common features on campus. There are other privately owned ICT centres mostly involved in printing as well. All these installations readily make Internet available to both students and tutors to aid in research, learning and teaching.

4.6 Conclusion

The chapter provided a brief background of Ghana and further presented the educational settings, which shows how most developing countries set up their educational structures. Overview of the selected four universities was also presented to highlight the composition and formation of each university in Ghana. For the purpose of this study, overview of KNUST, Cape Coast University, University of Ghana and UPS have been presented. This chapter indicates that educational technologies have gain prominence in the Ghanaian educational sector and major stakeholders in the educational sector have developed ICT policies and programs to shape the pedagogical practices in Ghana. This chapter reveals that there have been several attempts by the Ministry of Education in Ghana to support various institutions in teaching ICT literacies.

Chapter 5.0: Research Methodological Design

This chapter describes the research methodological design employed to investigate the adoption of educational technologies in the Ghanaian higher education sector. Literature review conducted in the preceding chapter has influenced the researcher's philosophical position and aided in shaping the research design for the research study. This methodological path has guided the researcher on what constitute human knowledge, what kind of knowledge will be gained from the research investigation and what characteristics exist about this knowledge that would be gained. The issues of ontology and epistemology has informed the researcher's theoretical perspectives and subsequently led to the type of methodological design path adopted. In the nutshell, the researcher has detailed the systematic methodological design, which was followed to arrive at the final stage of this investigation.

5.1 Introduction

This chapter presents the various research strategies, which are available for enquiry by means of the methodological designs and processes. Issues of research philosophies and paradigms that critically underlie the success of the research study have also been evaluated. This chapter also explains the available research approaches and data collection techniques that were employed for this study, and finally, issues relating to validity and reliability as well as research ethical considerations have all been discussed.

It is in light of this that the following structure was design, which would successfully help in each stage of the methodological design processes and adequately support the progression of this research study.

1. To discuss the difference between research methods and methodology.
2. To explore the research philosophies and its associated ontological and epistemological assumptions, which critically form the foundation of the approaches, employed in this research
3. To explore different research approaches available and to justify the approach employed for this research.

4. To discuss and justify the most appropriated data collection methods adopted.
5. To explore and select the most appropriate approach for analysis and interpretation of the data which would be collected.
6. To discuss the issues of research validity and reliability as well as ethics of this research which would strictly be observed

5.2 Research Methods versus Methodology

It seems appropriate at this juncture to explain the difference between research methods and research methodology. This aids in understanding various approaches in research investigation before selecting the suitable approaches for any particular study.

Research methods may be understood as all those methods/techniques that are used for conduction of research (Blaikie, 2010). Research methods or techniques, thus, refer to the methods the researchers use in performing research operations (Oates, 2014). In other words, all those methods, which are used by the researcher during the course of studying the research problem, are termed as research methods.

On the other hand, research methodology is a way to systematically apply those individual techniques to solve the research problem (Collis & Hussey, 2014). Oates (2006) also supported this by explaining that, it may be understood as a science of studying how research is done scientifically: in it we study the various steps that are generally adopted by a researcher in studying the research problem along with the logic behind them. As confirmed by Bazeley and Jackson (2013), research methodology is the process followed by a researcher to achieve the aims and objectives of a particular research. To undertake this research investigation, it is necessary for the researcher to know not only the research methods/techniques but also the methodology.

Saunders *et al*., 2012, argue that researchers need to understand the assumptions underlying various techniques and to know the criteria by which they can decide that certain techniques and procedures will be applicable to certain problems and others will not. This means that it is necessary for the researcher to design his/her methodology for the problem as the same may differ from problem to problem. For example, an architect,

who designs a building, has to consciously evaluate the basis of his decisions, i.e., the researcher has to evaluate why and on what basis a particular size is selected, number and location of doors, windows and ventilators, uses particular materials and not others and the like. Similarly, in research the scientist has to expose the research decisions to evaluation before they are implemented. The researcher has to specify very clearly and precisely what decisions he/she selects and why he/she selects them so that others can evaluate them also.

From what has been stated above, we can say that research methodology has many dimensions and research methods do constitute a part of the research methodology. The scope of research methodology is wider than that of research methods. Thus, when we talk of research methodology we not only talk of the research methods but also consider the logic behind the methods we use in the context of our research study and explain why we are using a particular method or technique and why we are not using others so that research results are capable of being evaluated either by the researcher himself or by others (Saunders *et al*., 2012). Research methodology provides the basis to make informed decisions, step by step, about how research should be conducted.

The next section will provide the actual research methodology adopted for this study and its significance to the researcher. In a more elaborated form, the next section is for the researcher to select what research methods will enable the collection of data that is needed to answer the research questions

5.2.1 Choosing appropriate research methodology for this study

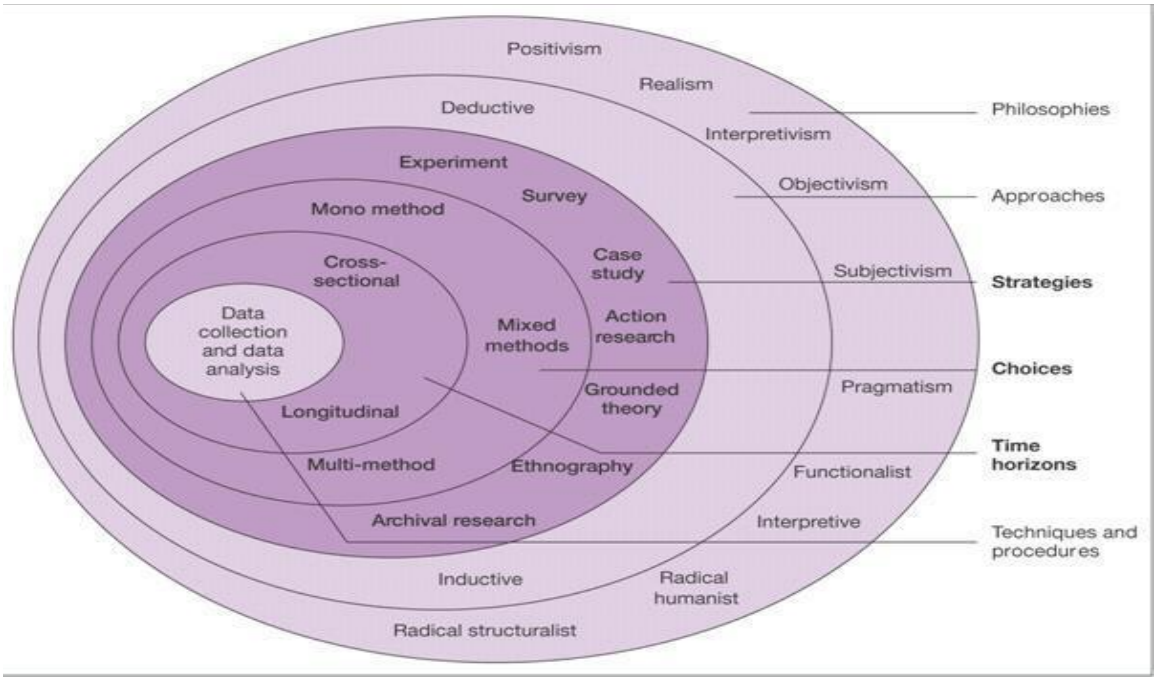
Having conducted a comprehensive literature review on research methods and designs, it emerged that there are differences in the perceptions, interpretations and terminologies used in the explanations and description of research methodologies. Authors such as Saunders *et al* (2012), Kagioglou *et al* (1998) and Crotty (1998) all have different terminologies used in their description of research methodology.

Saunders *et al* (2012) also developed the ‘research onion’ (as illustrated in figure 5.1 below) to show what elements constitute research methodology. This onion has six main elements, which constitutes research methodology. Per the ‘onion’, the outer layer is the

research philosophy. Beyond research philosophy, lies, the *research approach* which leads the researcher into the third layer- *research strategy*. This is followed by the *research choices* available to the researcher. The researcher will be able to move to the *data collection* stage by determining the 'time horizons' for the research.

It is worth mentioning that the researcher adopted the interpretivist philosophical paradigm for the study. A careful evaluation was conducted among some underlying philosophical paradigms before arriving at the chosen paradigm, which informed the study. The following section has examined and presented the comparisons made among available research paradigms before choosing the interpretivist paradigm.

Figure 5.1: Research Onion



Source: Saunders *et al*., (2014)

However, Crotty (1998) criticized the research onion for having to exclude the research question in their respective research methodological designs. He argues that the inclusion of the research question provides the researcher the guidance and focus within the research. For the purpose of this study, a theoretical path has be created (Figure 5.2), which is based on Saunders *et al* (2012) 'research onion' and Crotty's (1998)

'hierarchical levels' which includes the research question in the research methodological design. The following methodological path was designed because it provides the researcher the systematic approach to conduct the research under study.

Having reviewed the literature on research methods, the researcher compared and contrasted various research methods techniques. Figure 5.2 was constructed by combining the views of Saunders *et al* (2014) 'research onion' and Crotty's (1998) idea of 'research question'. This was the methodological pathway the researcher adopted in conducting the research investigation.

Figure 5.2: Methodological theoretical pathway

Source: Saunders *et al* (2014) and Crotty (1998)

5.3 STAGE 1: Research Philosophy

A research of this nature requires the consideration of research philosophies in order to capture to understand different research paradigms and matters of ontology and epistemology. Philosophy is a ‘set or system of beliefs stemming from the study of the fundamental nature of knowledge, reality and existence’ (Hatch and Cunliffe, 2006). These parameters explain the researcher’s assumptions, beliefs and the nature of reality and truth; they can extensively induce the researcher’s approach employed from the design through to conclusion and recommendations. It is therefore necessary to take note of these characteristics, to discuss and lay them bare in perspective of how a particular inquiry was adopted and to try as much as possible to ensure that researcher biases are understood, exposed, and minimized (Flowers, 2009). Researchers have their independent worldview, which is likely to influence the subject matter.

For example, James and Vinnicombe (2002) agree to the notion that we all have inherent preferences that are likely to shape our research designs. Blaikie (2010) further describes these preferences as part of choices that the researcher must take into account and he shows the alignment that must reconnect these choices to the original Research Problem. If this is not achieved, other methods may be adopted even if they appear incompatible with the researcher’s stance, with the final result being undermined as incoherent.

In studying human behaviour, these features cannot be overlooked since the human element introduces a component of ‘free will’ that adds a complexity beyond that seen of the natural sciences (Blaikie, 1993). Social scientists agree human behaviour is unpredictable and messy. It does not follow a systemic trajectory. Thus, Hatch and Cunliffe (2006) argue that different models ‘encourage researchers to study phenomena in different ways’. From this angle, they described a number of organizational phenomena highlighting how observing the same phenomena from different philosophical perspectives may derive plausible information. In contrast, Denzin and Lincoln (2003) and Kvale (1996) highlight how these variant positions can result in much tension amongst academics.

5.3.1 Importance of research philosophies

Easterby-Smith *et al*., (2015), pointed out some importance of understanding research philosophies. They noted that, firstly, the understanding of research philosophies helps to effectively clarify and formulate the research design and structure of the overall research, which provides the right insight to select the appropriate data collection techniques and to proper interpret it. Secondly, it serves as a guide to the researcher in making the appropriate and suitable methodological decisions, which indicates the benefits and limitations of each stage of the research process. Finally, it assists the researcher to effectively generate new and advanced ideas with regards to research methodological design and simultaneously adapt existing knowledge in accordance to the research topic being carried out.

Researchers such as Collis & Hussey (2014); Saunders *et al*., (2012); Easterby-Smith *et al,* (2015); Oates (2013) all pointed out that the understanding of various arguments surrounding both ontological and epistemological assumptions are vital to the researcher before any meaningful research framework could be arrived at. These debates about both assumptions helps the researcher to carefully and systematically highlights a particular philosophical positioning that underpins the research strategy that perfectly aids the data collection. Easterby-Smith *et al*., (2015) explained that researcher's failure or inability to link various parameters such as the actual relationship that exist between data and theory, could jeopardise the quality of the research.

Thietart (2001) noted that understanding and recognising issues of philosophical positions helps the researcher to control the research approach, and increase the quality of knowledge or ideas produced as well as making the overall knowledge cumulative. Saunders *et al*., (2012) also affirmed the above ideas by asserting that the researcher's beliefs and assumptions about the world inevitably induce the research strategy selected and adopted for a particular investigation. Johnson & Clark (2006) also agree that researchers in the social sciences needs to be fully aware of all philosophical commitment that are made through the selected research strategy, because it has a significant impact on how a particular research is understood and carried out. Flowers (2009) and Saunders *et al*., (2012) also agree with this assertion, pointing out that research philosophies is the

integral starting point to any research investigation.

The next section discussed these factors into more detail, which provided the awareness and understanding, before selecting and explaining the approach that was selected as a preface to the full research design.

5.3.2 Ontological assumptions

Blaikie (1993) illustrates the root definition of ontology as 'the science or study of being' and formulates this for the social sciences to encompass 'claims about what exists, what it looks like, what units make it up and how these units interact with each other'. Generally, ontology explains our view (whether claims or assumptions) on the nature of reality but more specifically, whether this objective reality really exists, or it is only a subjective reality created in our minds. By using both an everyday example and a social science example, Hatch and Cunliffe (2006) illustrates the point by using both the social science example and every day. For the everyday example, they used the example of a workplace report – asking if it truly reflects the reality on the ground or just what the author think is going on. They also stress on the complexity in dealing with phenomena such as culture, power or control, asking if they really exist or are simply an illusion, further extending the discussion as to how individuals or groups determine these realities – does the reality exist only through experience of it (subjectivism), or does it exist independently of those who live it (objectivism).

This implies that our view on what is real and whether we attribute existence to one set of things over another also depends on a number of deeply embedded ontological assumptions. Thus, aspects of an inquiry or a phenomenon, since they are implicitly assumed, may be hidden from a researcher if these underlying assumptions are not identified and subjected to questioning for a thorough discussion.

The explanation offered above has greatly helped the researcher in recognising the philosophical position for this study. The researcher's philosophical position identifies that there are many truths, adding that scientific laws are not just available out there but to be effectively discovered. This is what Collis & Hussey (2014) termed as 'relativism'. This ontological position assumes that different observers may have varying viewpoint

and what actually counts as truth can vary from time-to-time and place-to-place. This is due to the fact that the world can be interpreted in different ways in an environment that is socially constructed and is not a social entity (Doran, 2014)

In considering that different views exist as to what constitutes reality; a question that must be asked is how that reality will be measured and what constitutes knowledge of that reality. This leads us to questions of *Epistemology*.

5.3.3 Epistemological assumptions

Blaikie (1993, p. 28) defines epistemology as 'the theory or science of the method or grounds of knowledge.' He further expands this into a set of claims or assumptions about possible ways of attaining the knowledge of reality, how what exists may be known, what can be known, and what conditions should be satisfied in order to be depicted as knowledge. Epistemology is closely linked to ontology and its consideration of what constitutes reality. It considers the most suitable ways of enquiring into the nature of our world (Easterby-Smith *et al*., 2014) and 'what is knowledge and what are the sources and limits of knowledge' (Eriksson and Kovalainen, 2008). In epistemology, most questions asked usually attack or critique the research method. In discussing epistemology further, Eriksson and Kovalainen ask how knowledge can be produced and argued for.

Chia (2002) views epistemology as 'how and what it is possible to know' and the need to focus on methods and standards through which reliable and verifiable knowledge is produced. Hatch and Cunliffe (2006) explained epistemology as 'knowing how you can know'. For example, how knowledge is generated, what distinguishes good knowledge from bad knowledge, and how reality should be represented. They go on to highlight the inter-dependent relationship between epistemology and ontology, and how each both informs, and depends upon the other.

Considering this link, it becomes more obvious to understand the position of the researcher. A researcher's epistemological choices or conclusions may be as a result of certain ontological positions or assumptions he/she may hold. Hence, as with ontology, both objective and subjective epistemological views exist. By describing an objective epistemology, Eriksson and Kovalainen (2008) presume that there exists a world that is

external and theory neutral, whereas within a subjective epistemological view it is impossible to access an external world beyond our own observations and interpretations. Saunders *et al*., (2012) discuss this further, illustrating that some researchers argue that data collected from objects that exist separate to the researcher (an external reality) is more objective and less open to bias. Thus, if social phenomena are studied, they must be presented in a statistical manner rather than narrative form to be accepted as credible enough and also withstand the dangers that the imminent challenge of researchers are most likely to pose to it. Moreover, Blaikie (1993) argues that since social research involves so many choices, the probability that this process will ultimately achieve true objectivity suffers because of the researcher's intrinsic values and preferences.

The discussion continues to our next area of discussion explained by Blaikie (2000) as the 'research paradigm' and by some others (Saunders *et al*., 2012) as the 'research philosophy'. These philosophies are formed from basic ontological and (the related) epistemological positions (Flowers, 2009), and have developed through both classical and contemporary forms to effectively categorize different research approaches.

According to Denzin and Lincoln (2003), a research paradigm is 'an interpretive framework' and by borrowing from Guba (1990), it is a 'basic set of beliefs that guides action'. The next chapter considers two key paradigms – the positivist (classical), interpretivist / constructivist (classical) as well as contemporary paradigms.

5.4 STAGE 2: Research Paradigms

The term paradigm originated from the Greek word '*paradeigma*', meaning pattern (Bryman and Bell, 2014). It was first used by Thomas Kuhn (1962) to signify a conceptual framework shared by a community of scientists, which provided a convenient system for effective examination of problems and finding solutions. This was reflected in Kuhn's (1962, p. 35) first definition as 'universally recognized scientific achievements that for a time provide model problems and solutions to a community of practitioners'.

A research paradigm is a philosophical framework that directs our conduct into a scientific research. This was also highlighted in Collis and Hussey's (2014) definition

that, research paradigm is a framework that guides how research is conducted, based on people's philosophies and their assumptions about the world and the nature of knowledge.

With the advancement in research, Kuhn (1977, p. 23) redefined paradigm as "an integrated cluster of substantive concepts, variables and problems attached with corresponding methodological approaches and tools…" According to him again, the term paradigm refers to a research culture with a set of beliefs, values, and assumptions that a community of researchers has in common regarding the nature and conduct of research (Kuhn, 1977). To Punch (1998), paradigm is a pattern, structure, framework or system of scientific and academic ideas, values and assumptions. Charmaz (2006, p. 29) defines it as "*made up of the general theoretical assumptions and laws, and techniques for their application that the members of a particular scientific community adopt*" (p. 90). Charmaz (2006, p. 23) further points out that a paradigm has five components:

- Explicitly stated laws and theoretical assumptions.
- Standard ways of applying the fundamental laws to a variety of situations.
- Instrumentation and instrumental techniques that bring the laws of the paradigm to bear on the real world.
- General metaphysical principles that guide work within the paradigm.
- General methodological prescriptions about how to conduct work within the paradigm.

5.4.1 Traditional approaches to research paradigms

Over many centuries ago, there was just but one research paradigm. As reflected by Kuhn (1962, p. 25), '*scientific achievement' stemmed from one source, which is presently called natural science to distinguish them from the social science'.* Smith *et al* (2011) further explained that until the 19th century, research had only focused on inanimate objects in the physical world such as physics, which for example, focuses on properties of matter and energy and the interaction between them. The systematically organized methods used by these scientists involved observation and experiment accompanied by deductive logic in discovering and confirming instructive theories that could be used for prediction. Their beliefs about the world and nature of knowledge were based on

positivism, a concept developed by theorists such as Comte (1798-1857), Mill (1806-1873) and Durkheim (1858-1917).

The advent of industrialization and capitalism influenced researchers and turn their attention to social phenomena. Initially, these new social scientists used methods established by the natural scientists, but this practice was challenged by a number of theorists leading to debates that lasted many decades (Smith *et al*., 2011). The substitute to positivism could somehow be labelled as *interpretivism*, which is based on the principles of idealism, a philosophy associated with Kant (1724-1804) and subsequently developed by Dilthey (1833-1911), Rickert (1863-1936) and Weber (1864-1920). This means that the emergence of social sciences paved way for the development of the second research paradigm. Figure 5.3 shows the two main traditional paradigms that were used before the emergence of modern research paradigms.

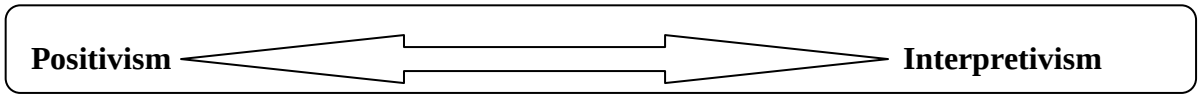


Figure 5.3: A continuum of paradigms (Source: Doran, 2014)

5.4.1.1 Positivist

The historical development recounted above shows how positivism provided the framework for which a research is conducted in the natural sciences and the scientific methods that are still widely used in social science research today. Auguste Comte (1798-1857) is believed to have coined the term 'positivism'. He believed that legitimate knowledge could only be found from experience (Eriksson and Kovalainen, 2014). According to Collis and Hussey (2014), positivism is underpinned by the principle that reality is independent of us and it aims to discover theories based on empirical research (observation and experiment). Knowledge is derived from 'positive information' once it can be scientifically verified. By this, Oates (2012) was trying to say that it is possible to logically or mathematically prove any rationally justifiable claim. Flowers (2009), agreeing to this position, presume the social world exists externally objective, and that knowledge is valid only if it is based on observations of this external reality. He also believes universal or general laws exist but argues that theoretical models can be

developed that could be generalized to explain cause-and-effect relationships and for predicting outcomes.

Positivism is supported by values of reason, truth and validity but its focus is purely on facts gathered through direct observation and experience, and empirically measured using quantitative methods (surveys and experiments) and statistical analysis (Blaikie, 1993; Saunders *et al*., 2014; Eriksson and Kovalainen, 2014; Easterby-Smith et al., 2015; Hatch and Cunliffe, 2006). The positivist position is derived from that of natural science and is characterized by the testing of hypothesis developed from existing theory (hence deductive or theory testing) through measurement of observable social realities. Hatch and Cunliffe (2006) explains it in an organizational context, stating that what really happens in organizations can only be exposed through categorization and scientific measurement of the behaviour of people and systems. Language is also truly considered representative of that reality.

Some researchers (Creswell, 2014 and Collis & Hussey, 2014) have however punched holes into positivism stating some perceived inadequacies listed below in their criticism.

- It is impossible to separate people from the social contexts in which they exist.
- It is not easy to understand people without examining how they perceive their world.
- A highly structured research design imposes constraints on the results and may ignore other relevant findings.
- Researchers are not objective, but part of what they observe. They bring their own interests and values to the research
- Capturing complex phenomena in a single measure is misleading (for example, it is not possible to capture a person's intelligence by assigning numerical values)

5.4.1.2 Interpretivist

Hatch and Cunliffe (2006) explains interpretivism as anti-positivism and by Blaikie (1993) as post-positivism since it is contended that there is a fundamental difference between the subject matters of natural and social sciences. Interpretivists believe that social reality lies in our individual minds, thus subjective and multiple. To Collis and

Hussey (2014), interpretivism is a school of thought that emerged in response to the criticisms of positivism. In the social world, it is argued that individuals and groups' understanding to situations depend upon experiences, memories and expectations. In other words, meaning is constructed and constantly re-constructed over time through experience accompanied by various or multiple interpretations into creating a social reality by which people act.

Under this paradigm, it is apparently necessary to discover and understand these meanings notwithstanding the contextual factors that influence, determine and affect the interpretations reached by these different individuals. Interpretivists consider that there are multiple realities (Denzin and Lincoln, 2003). Since 'all knowledge is relative to the knower', Interpretivists in the context of their research academic experience try as much as possible to work alongside others as they make sense of, draw meaning from and create their realities in order to understand their points of view and to interpret these experiences (Hatch and Cunliffe, 2006). Hence, this becomes an inductive or theory building approach.

The focus of an interpretivist is to understand the meanings and interpretations of 'social actors' and therefore understanding their worldview is so highly contextual to be widely generalized (Saunders *et al*., 2012). Understanding what people think and how they feel and communicate (verbally or non-verbally) is important (Easterby-Smith *et al*., 2014). The subjective nature of this paradigm together with its emphasis on language qualifies it for the qualitative approach to data gathering (Eriksson and Kovalainen, 2014). The researcher is expected to be close to the researched in this paradigm, and the risk this also poses in subjectively framing interpretations within the mind of the researcher requires some steps to be taken to avoid biases.

As was done to positivism, Hammersly (2013) also levelled some criticisms against interpretivism which are presented below:

- Descriptions are too vague and inconsistent in providing a sound basis for comparing the orientations of different people and their characteristics within different situations.

- It does not provide a means of showing how one set of factors, rather than another, plays key role in bringing about particular outcomes.
- It encourages the study of a small number of cases, thereby failing to provide a platform for broader conclusion.
- It is preoccupied with a coherent and newsworthy narrative, rather than checking the validity of the interpretations produced.
- It presents the standpoint of the researcher, rather than that of the true response provided by the individuals being studied.

5.4.1.3 Assumptions of positivism and interpretivism

In designing a research project, we must consider the philosophical assumptions underlying both the positivism and interpretivism paradigms in order to ascertain whether the direction of the study broadly falls under any of these paradigms. This may change as the study progresses. Drawing from some other authors (Eriksson and Kovalainen, 2014; Easterby-Smith *et al*., 2014; Saunders *et al*., 2012; Collis and Hussey 2014), a summary of assumptions of the two main paradigms is provided in table 5.1 below

Table 5.1: Assumptions of the two main paradigms

Philosophical assumptions	Positivism	Interpretivism
Ontological assumption **(the nature of reality)**	Social reality is objective and external to the researcher. There is only one reality.	Social reality is subjective and constructed. There are multiple realties.
Epistemological assumption **(what constitutes valid knowledge)**	Knowledge comes by objective evidence through observation and measurable phenomena. The researcher is distant from phenomena under study.	Knowledge comes by subjective evidence of participants. The researcher interacts with phenomena under study.

Methodological assumption **(the process of research)**	The researcher takes a deductive approach. The researcher studies cause and effect, uses a static design where categories are identified in advance. Generalizations lead to prediction, explanation and understanding. Results are accurate and reliable through validity and reliability. Use of large samples. Produce precise and quantitative data.	The researcher takes an inductive approach. The researcher studies the topic within its context and uses an emerging design where categories are identified during the process. Patterns and / or theories are developed for understanding. Findings are accurate and reliable through verification. Use of small sample size. Produce 'rich' and qualitative data.

Sources: Adapted from Eriksson and Kovalainen, 2014; Easterby-Smith *et al*., 2014; Saunders *et al*., 2012; Collis and Hussey 2014.

Collis & Hussey (2014) argue that for a model to be fully established, more modern approaches to research paradigms need to be explored. There are series of issues (debates and inconsistencies) with the traditional paradigms presented in this section which have also led to a series of new formulations based on the two classic opines. These are analysed before the research paradigm for this study is presented.

5.4.2 Modern Approaches to Research Paradigms

Ideas about reality and nature of knowledge have changed over time. It is therefore not surprising to see the emergence of new research paradigms in response to the perceived inadequacies of the earlier ones. The dominance of positivism coupled with its criticisms, all through interpretivism has spurred on new philosophical positions as scientist's debate themselves.

As already mentioned above (Refer to table 5.1 above), there are two main research paradigms with different underlying assumptions namely, positivism and interpretivism.

Aside these two traditional paradigms, other authors have introduced some other interesting paradigms due to advancement in research, which have become very useful in today's world of research. Saunders *et al*., (2012) for example attest to four research paradigms: Positivism, Realism, Interpretivism and Pragmatism. Collis and Hussey (2014) list out three, namely: Positivism, Interpretivism and Pragmatism whereas Oates (2013) argues over just two: Positivism and Interpretivism. Eriksson and Kovalainen (2013) names four main paradigms: Positivism, Post-positivism, Realism and Constructionism. However, Easterby-Smith *et al*. (2015) names five main paradigms: Realism, Nominalism, Positivism, Social Constructionism and Pragmatism. Guba and Lincoln (1998) identified four key paradigms: Positivism, Post-positivism, Critical Theory and Constructivism.

For the purposes of this study, five major paradigms in the research community are described in the next section. The lines between them are not too clear in practice so researchers should be guided in identifying the worldview that most closely approximates their own.

- Post-Positivism
- Realism
- Constructivism
- Pragmatism
- Transformative

5.4.2.1 Post-Positivism Paradigm

The dominant paradigm that guided early educational and psychological research was *positivism.* Positivists hold the view that the use of the scientific method allowed for experimentation and measurement of what could be observed, with the aim of discovering general laws in describing constant relationships between variables (Eriksson and Kovalainen, 2014). Positivists claim that "*scientific knowledge is utterly objective and that only scientific knowledge is valid, certain and accurate*" (Crotty, 1998, p. 29). Although the focus on empirical and objective data has some appeal, it falls short when applied to human behaviour.

Nevertheless, post-positivist psychologists rejects the positivists' view on reality describing it as narrow because positivism suggests that what could be studied is only limited to what could be observed. These post-positivists claim there are some human experiences such as feeling and thinking which is not observable but still remains relevant. They also challenge a researcher's ability to establish laws, which could be generalized with respect to human behaviour.

It argues that the knower and the known cannot be separated (as positivists claim). It also questions the idea of a shared, single reality but do suggest of rigorous data collection and analysis even though human beings cannot perfectly understand reality (Shadish *et al*., 2002). Post-Positivists still stress on the importance of objectivity and generalizability, but they encourage researchers to modify their claims to understandings of truth based on probability rather than certainty. Research methodologists such as, D. T. Campbell and Stanley (1963, 1966), T. D. Cook and Campbell (1979), and Miles and Huberman (2014), embraced the assumptions of post-positivism (Eriksson and Kovalainen, 2014).

5.4.2.2 Constructivist Paradigm

Constructivist model of research can be traced to the ideas from Edmund Husserl's phenomenology. Wilhelm Dilthey also relates this to the study of interpretive understanding and some other German philosophers popularly referred to as *hermeneutics* (Eichelberger, 1989). Hermeneutics is the study of interpretive understanding or meaning. Historians in particular make use of this concept within their discussions to interpret historical documents. They try to explain what the author was attempting to communicate, giving reference to the time period and culture in which these documents were written. Constructivists use the term more generally, seeing hermeneutics as a way of interpreting a meaning out of something from a given setting. By citing the works of Martin Heidegger (1927/1962), Slife and Richardson (2008) argue that all meanings, including meanings of research findings, are fundamentally interpretive. In this sense, all knowledge is developed within a pre-existing social milieu, ever interpreting and reinterpreting itself.

Despite the recognition by post-positivists that facts are theory laden, some other

researchers have questioned the underlying assumptions and methodology of that position. Basically, constructivists assume that knowledge is socially constructed by active people in the research process so it becomes necessary for researchers to attempt understanding the experiences lived in this complex world from the point of view of those who live it (Schwandt, 2001). The constructivist paradigm emphasizes that research is a product of the values of researchers and cannot be independent of them.

5.4.2.3 Realist Paradigm

Born out of frustration that positivism is over-deterministic (in that there is little room for choice due to the causal nature of universal laws) and that constructionism is also so totally relativist (and hence highly contextual), realism takes aspects from both positivist and interpretivist positions. It holds that real structures exist independent of human consciousness, but that knowledge is socially created, with Saunders *et al*., (2012) contending that our knowledge of reality is as a result of social conditioning.

According to Blaikie (1993), realism focuses on the kinds of things that exist and how they behave but it also accommodates the idea that reality may exist in spite of science or observation. There is therefore validity testing, whether proven or not, into recognizing realities that are simply claimed to exist or act. Similar to interpretivist positions, realism agrees to differences between the natural and social sciences and that social reality is pre-interpreted. It also upholds the positivists' proposal that science must be empirically based, rational and objective. Realism argues that social objects may be studied 'scientifically' as social objects, not simply through language and discourse.

Positivists are of the view that direct causal relationships exist, and that these relationships apply universally (leading to prediction) and can be understood through observation. Unlike positivists, realists are more interested in understanding and explanation rather than just predicting. They take into account the powers or tendencies that make things act in a particular way and how these tendencies could be influenced by other factors under various circumstances. Blaikie (2013) describes realism as 'ultimately a search for generative mechanisms.' He recognizes that the fundamental mechanisms of realism can act 'out of phase' or independently to the observable events and further

reaffirms that events can occur independently of them being experienced. Hatch and Cunliffe (2006) describes it as a 'stratified' form of reality whereby surface events are shaped by underlying structures and mechanisms but that what we see is just a portion of the whole picture.

In describing the realists from an organizational outlook, Hatch and Cunliffe (2006) indicate that they are researchers who enquire into the basic mechanisms and structures of institutional forms and practices, how these emerge over time, how they might empower or constrain social actors, and how such forms may be critiqued and changed. To realists, researching from different angles and at several levels will all contribute to understanding since reality can exist at multiple levels (Chia, 2002). Thus, realism is apparently an inductive or theory building representation.

5.4.2.4 Pragmatic Paradigm

Tashakkori and Teddlie (2009) identify pragmatism as one of the paradigms that best serves the philosophical framework of mixed methods approach to research. Historically, pragmatism can be categorized into an early period from 1860–1930 and a neo-pragmatic period from 1960 to date (Greene & Caracelli, 2002). Early pragmatists included Charles Sanders Peirce, William James, John Dewey, George Herbert Mead, and Arthur F. Bentley. These philosophers rejected the scientific conception that a social science inquiry was capable of accessing the "truth" about the real world solely by a single scientific method. Based on this belief, they were closely aligned to the constructionists.

The neo-pragmatists, including Abraham Kaplan, Richard Rorty, and Cornel West, advanced the works of the early pragmatists. They went beyond the metaphysical to emphasize the importance of common sense and practical thinking. Crotty (1998) wrote that Rorty developed a postmodernist version of American pragmatism.

Bryman (2007) expressed that an effective researcher should be flexible enough to be able to work within the most appropriate paradigm given the nature of the research problem under investigation. Collis and Hussey (2014) also contend that the research question should determine the research philosophy and those methods from several paradigms can be used in the same study. Also, rather than being 'constrained' to a single

paradigm, pragmatists advocate that researchers are 'free' to mix methods from different paradigms, choosing them on the basis of usefulness for answering research questions. They also do suggest that by ignoring the philosophical disputes about reality and nature of knowledge, the weakness of one paradigm can be offset with the strength of the other. According to Curran (1999, p. 123), this approach is an attempt to '*cross the divide between the quantitative and the qualitative and the positivist and the non-positivists*.'

5.4.2.5 Transformative Paradigm

The constructivist paradigm has been criticized not only by positivists and post-positivists, but also by a special group of researchers representing a third paradigm known as the transformative paradigm made up of critical theorists, participatory action researchers, Marxists, feminists, racial and ethnic minorities, persons with disabilities, etc. This group acknowledges the varied claims of the constructivist paradigm regarding reality, epistemology and methodology, and the theories of causality than do post-positivists. As elaborated in the description of the axiological suppositions of the constructivist paradigm, crusaders of qualitative methods are more and more interested in the need to situate their work in the context of social justice. This shift-away in the constructivist scholarship exposes the permeability of the paradigmatic boundaries. However, the transformative paradigm directly addresses the problem of research politics by tackling social oppression in whatever levels it might occur (Mounce, 1997). Thus, transformative researchers consciously and explicitly position themselves side by side with the vulnerable and less powerful in a joint effort to bring about social transformation.

Although the transformative paradigm is not well organized nor encapsulated in a unified body of literature, there are four common characteristics of its differing perspectives which differentiates it from the post-positivist and constructivist paradigms (Mounce, 1997). The features are as follows:

- The lives and experiences of the diverse groups who traditionally would have been marginalized (i.e., women, minorities, and persons living with disability) are given special recognition. Researchers are advised not to limit the study of the lives and experiences of these people to just one marginalized group but also to

study the way oppression is structured and reproduced. They are entreated to focus on the lives of members of oppressed groups, how it is restricted by the actions of oppressors, individually and collectively, and the strategies that these oppressed groups use to resist, challenge, and subvert it. Therefore, under the transformative paradigm, studying the life of the oppressed also encompasses the studying of the oppressors' means of dominance.

- It examines how and why inequalities based on gender, race, ethnicity, disability, sexual orientation, and socioeconomic classes are reflected in asymmetric power relationships.
- It analyses the relationship between social inequalities and political and social action.
- A transformative theory is used to develop the program theory and research approach. A program theory is a set of beliefs about the way a program works or why a problem occurs.

5.4.3 Selected Research Paradigm

As discussed above, there are some differences in the available literature concerning the types of research paradigms available to researchers. It was also noted that positivism and interpretivism were the traditional paradigms available to earlier researchers. However, as research advanced, criticisms also grew against these traditional paradigms, which shaped development of some modern research paradigms.

Having assessed both traditional and modern paradigms, this study adopted an Interpretivist position. Primarily this study is to inquire into the perspectives (thoughts and feelings) of individuals across leading Ghanaian State university Business Schools regarding educational technologies and also tries to interpret these findings in the context of the academic literature. As a guide to this study, literature was resorted to. However, this study does not set out to test pre-existing theories, for example, through hypothesis testing or experiments but will instead rely on qualitative data, with rich, open interviews and questionnaires involving stakeholders at various educational levels in discovering and understanding the individual and shared sense of meaning concerning Educational technologies.

Regarding contemporary research paradigms, this study can be tagged with that of a pragmatist worldview which is very dear to the researcher because it allows for mixed methods in offering practical solutions to the tensions created in the research community about the use of qualitative or quantitative methods. The researcher is provided with the needed flexibility to mix methods from different paradigms based on its usefulness to answer research questions at a particular point in time. Morgan (2007) asserts that research questions just by themselves are not inherently important and the methods are also not automatically appropriate. Rather, the researcher based on a general consensus, makes a choice about what is important and most appropriate within the community serving as the researcher's reference group. Researchers are encouraged to be reflexive about what they choose to study and how they choose to do so. Moreover, pragmatism is preferably the most suitable paradigm to explore and explain event in real life context.

Having explored and explained the various research philosophies and paradigms, the next section focuses on the purpose of this research and its associated methodologies.

5.5 STAGE3: Classification of research

It is very useful to identify the purpose of a research before framing its goals and objectives. According to Collis and Hussey (2014), social research projects can be classified into four categories: exploratory, descriptive, explanatory, and predicative research. However, an individual study may have multiple purposes or may be part of a program of research that spans from two to all four purposes.

5.5.1 Exploratory research

This type of research is conducted when there are very few or no existing studies for which we may have to refer for information about the issue or problem (Collis and Hussey, 2014). The main aim of this research is to discover and develop patterns and ideas rather than testing for hypothesis (Creswell and Tashakkori, 2007). Thus, Oates (2014) in his contribution puts forward that; exploratory research typically seeks to create hypothesis rather than testing them. Similarly, Bryman and Bell (2011) do argue that the goal of exploratory research is to formulate problems, clarify concepts and form

hypotheses. In exploratory research, the main focus is on gaining insights and familiarity with the subject area for more rigorous investigation on a larger scale.

Exploration may begin with a literature search, a focus group discussion, or case studies. In conducting a survey for exploratory purposes, no attempt is made to examine a random sample of a population. Instead, researchers will more often than not identify experts or individuals who are well vexed in a particular process or topic and subject them to brainstorming sessions, interviews, or post a short survey on a social media website.

5.5.2 Descriptive research

Under descriptive studies, there are guidelines to follow. It describes people, products, and situations (Blaike, 2014). Descriptive studies normally have one or more research questions as a guide and are generally not driven by structured research hypotheses (Collis & Hussey, 2014). This type of research frequently aims to describe the characteristics of populations based on data collected from samples (Oates, 2014). It often requires the use of a probability sampling technique such as the simple random sampling. Both the qualitative or quantitative methods can be used. However, the quantitative data presentations are usually limited to frequency distributions and summary statistics, such as averages. Customer satisfaction surveys, presidential approval polls, and class evaluation surveys are examples of descriptive experiments.

5.5.3 Explanatory or Analytical research

As its name suggests, explanatory research is used to explain why a phenomena occurs and also to predict future occurrences (Saunders *et al*., 2012). It is characterized by a research hypothesis that stipulates the nature and direction of the relationships between variables under study (Bryman & Bell, 2014). Explanatory research usually requires the probability sampling method because the objective is often to generalize results over the population from which the sample was taken. Data under this research is quantitative and invariably require the use of a statistical test into establishing the validity of relationships (Easterby-Smith *et al*., 2015). An explanatory research survey may for instance examine the contributing factors to customer satisfaction and determine the relative weight of each factor, or perhaps seek to model the variables that lead to shopping cart abandonment

(Bazeley & Jackson, 2014).

5.5.4 Predicative research

The predicative research goes beyond the explanatory. Whereas explanatory researches try to forecast the probability of a situation occurring elsewhere, the predicative research given this same situation will try to establish an explanation for current happenings (Eriksson & Kovalaine, 2008). After data analysis, researchers here will then move to generalize by predicting certain phenomena on the basis of hypothesized, general relationships so that the solution to a problem can be applied to similar problems elsewhere (Oates, 2014). This argument holds if the predicative research can provide a valid, robust solution based on a clear understanding of relevant causes. Predicative research provides the 'how', 'why' and 'where' answers to current and similar future events.

Carefully scrutinizing the main features of the different research types discussed above helps in understanding the major reasons why several of these researches are conducted. Classified as an *exploratory research*, this project initially commences with a comprehensive literature review to fully understand the subject area. Next, is interacting with experts within the field of educational technologies. Individual case studies were undertaken from Ghanaian higher education. The outcome would typically seek to create hypothesis on the usage of educational technologies in Ghanaian universities.

5.5.6 Applied vs. Basic research

According to Collis and Hussey (2014), the standard classification of research outcome divides projects into basic and applied research. As a result, the outcome of this study will undergo some classifications.

Applied research is a study that has been designed to apply its findings into solving specific, existing problems. It is the application of existing knowledge to improve management practices and policies. This type of research is likely to be a short-term project (often less than six months) and its capability of solving real world problems is of more importance than just academic theorizing (Saunders *et al*., 2014). For example, you might be investigating the recognition of an office layout, the improvement of safety in

the workplace or the reduction of wastage of raw materials or energy in a factory process. The results from this type of research could possibly be akin to a consultant's report, an article in a professional/trade magazines or even presentations to practitioners.

However, *basic research* or pure research is a type of research usually conducted when a prevailing problem is of a less magnitude, mainly because its primary objective is to improve our understanding of general issues without emphasis on its immediate application (Collis & Hussey, 2014). It is regarded as the most academia for research projects, as the major aim is to contribute to knowledge, usually for the general good rather than solve a specific problem for perhaps, one organization. For instance, one may be interested to know whether personal characteristics influence people's career choices. Basic research is exploratory in nature and is often driven by the researcher's curiosity and intuition.

Distinguishing between the above two, we conclude this research study is a basic research. It does not set out to encourage the use of educational technologies in Ghanaian universities; instead, the researcher at this time is only curios about exploring the type of educational technologies used in these universities and how competent the students and tutors are in their learning and teaching deliveries using educational technologies. It is a basic research also because it is an academia form of research; in that it must be submitted to the University of Salford in partial fulfilment of the requirement for the degree of Doctor of Philosophy.

5. 6. STAGE 4: Research Approaches

There are two different approaches to research namely, deductive and inductive research. Generally, a deductive research proceeds from theory to data (theory, method, data, and findings). It entails the development of a conceptual and theoretical structure prior to its testing through empirical observation (Gill and Johnson, 2010). While providing insight to deductive research, Remenyi *et al*. (1998) recalls that the researcher in this approach may have deduced a new theory by analysing and then synthesizing ideas and concepts already present in the literature.

Emphasis in this type of research is to deduce ideas or facts from the new theory in the hope that it provides a better or more coherent framework than preceding theories. However, by taking a slightly different perspective, Gill and Johnson (2010) argue that what is important is the logic in deducing coupled with the operational process and how these will engage the consequent testing of the theory by confronting it with the empirical world. Deduction research, according to Collis and Hussey (2014), is the dominant approach in the natural sciences where laws form the basis of explanation, allow the anticipation of phenomena, predict their occurrence and thus permit them to be controlled.

Accordingly, Patton (2000) set up five sequential stages of progression to deductive research:

- Deducing a hypothesis from the theory
- Expressing the hypothesis in operational terms
- Testing the operational hypothesis
- Examining the specific outcome of the inquiry
- If necessary, modifying the theory

Conversely, inductive research proceeds rather from data to theory (method, data, findings, and theory). Within the inductive approach, theory follows data rather than data following theory as with the deductive approach. Gill and Johnson (2010) explain that learning is done, by reflecting upon past experiences and the formulation of abstract concepts and theories. By implication, Kuhn (1962) suggests that deductive researchers are enslaved normal scientists, while inductive researchers are paradigm-breaking revolutionaries (Glaser and Strauss, 2006). Although the debate between supporters of both induction and deduction have a long history, Gill and Johnson (2010) claim that modern justification for taking an inductive approach in the social sciences tends to revolve around two related arguments:

- The explanation of social phenomena grounded in observation and experience
- Critique of some of the philosophical assumption embraced by positivism

For many researchers working within the inductive tradition, explanations to social phenomena are relatively worthless unless they are grounded in observation and experience. Grounded theory is a concept developed by Glaser and Strauss (2006, p. 45), which they define as '*an inductive, theory discovery methodology that allows the researcher to develop a theoretical account of the general features of a topic while simultaneously grounding the account in empirical observations or evidence*'. In attempting to develop a grounded theory, the researcher will approach the enquiry with a reasonably open mind as to the kind of theory that will form the research (Remenyi *et al*., 1998).

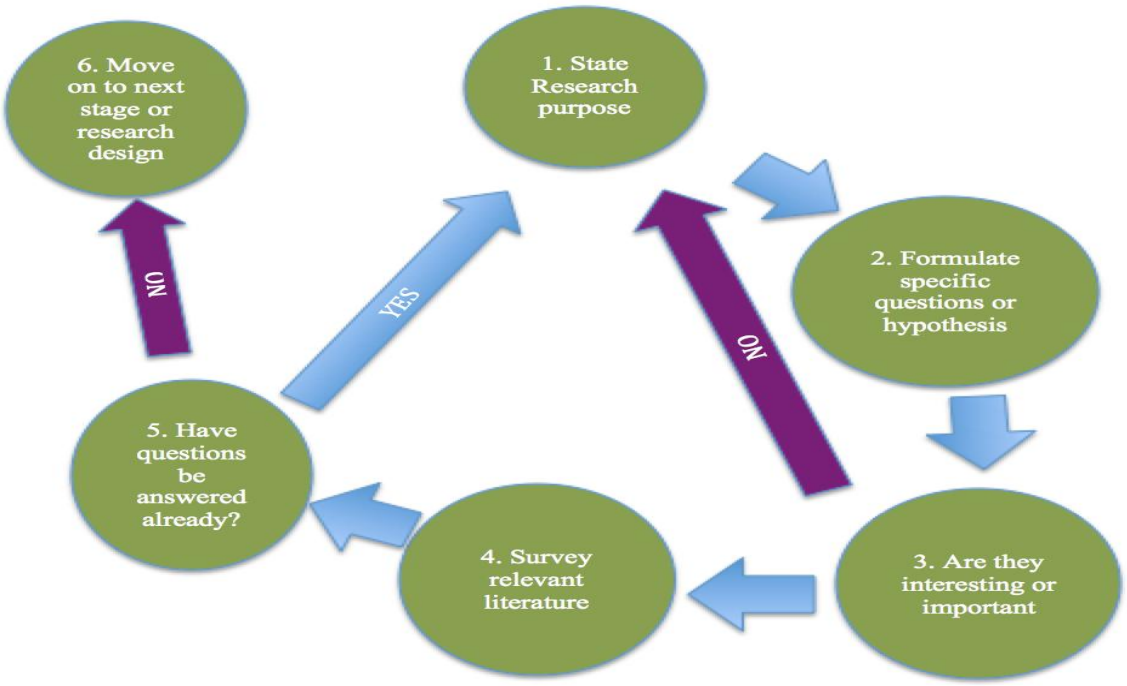
This particular research seeks to explore and understand the adoption of educational technologies in Ghanaian universities. An inductive approach is therefore necessary and a sufficient approach. It does not intend to test any particular theory, but rather, its findings would be made in a form of a theory to guide and explain the reasons for the use or avoidance of educational technologies in the Ghanaian Universities.

5.7 STAGE 5: Research questions design

Research questions are very crucial in the research process because they try to bring to the fore the most basic of issue – what is it that the researcher want to know? Thus, having no research questions or a poorly formulated one will lead to a poor research outcome. Collis & Hussey (2014, p.103) defined research question 'as a specific question the research is designed to investigate and attempt to answer'. Studying research questions alone might therefore reveal the intent of the research work even if they do not necessarily appear as the actual questions of the questionnaire or interview.

At the heart of a research design is the research questions. Proving how crucial research questions are, Bryman & Bell (2011, p.10) notes: '' if you do not specify clear research questions, there is a great risk that your research will be unfocused and that you will be unsure about what it is about or why you are collecting data''. Moreover, Collis & Hussey (2014) have put forward a simple model, which shows how to develop research questions. This is shown in figure 5.4 below.

Figure 5.4: Model for identifying research questions



Source: (Adapted from Collis & Hussey, 2014, p. 104)

In conducting a research work, Eriksson & Kovalaine (2014) advice that there are various types of research questions that researchers need to take into account, explaining that the 'what', 'how' and 'why' questions are all typical of a qualitative research. The 'what' questions are descriptive, focusing on exploring and describing states, situations or processes? The 'how' and 'why' questions focus on the causes and consequences of a phenomena. That is, they aim at answering or explaining something in qualitative terms. These ideas have been simplified below:

- 'What' questions generate descriptions about states, situations and processes
- 'How' questions shape understanding of how something take place, works and interacts
- 'Why' questions offer explanations for states, situations and processes

As crucial as they may be, some factors must be considered exclusively when formulating research questions under the various research paradigms (Collis & Hussey, 2014). Under a positivist paradigm, Blaikie (1993) recommends a specific research

question, followed by a number of hypotheses whiles Kerlinger & Lee (2000) propose that good research questions for a positivist study should:

- Express a relationship between variables
- Be stated in unambiguous terms in a question form
- Imply the possibility of empirical testing

Emphasis on the interactions between the researcher and the subject of study under interpretivist studies makes the criteria for a good research question less clear as compared to the positivists. In an interpretivist approach, research questions often evolve during the process of research and may need to be redefined or modified as the study progresses. There are different interpretivist methodologies with various customs, which will be apparent from the literature you read on your topic. The best advice is to concentrate on the language of the question. It is normal to begin the research question with 'what' or 'how' to avoid terms associated with positivism, such as 'cause', 'relationship' or 'association'. Creswell (2014) suggests that you should:

- Avoid wording that suggest a relationship between variable, such as 'effect', 'influence', 'impact' or 'determine'.
- Use open-ended questions without reference to the literature or theory, unless otherwise permitted by the research design.
- Use a single focus and specify the research site.

5.7.1 Study's research questions

This study focuses on the factors that influence students and tutors' use of educational technology in their learning and teaching deliveries? Specific guiding questions were as follows:

1. What are educational technologies (EduTech)?
2. What kinds of EduTech do universities in Ghana mostly use?
3. What reasons did teachers have for using or not using educational technologies in teaching deliveries?
4. What consequences exist in using educational technologies in Higher Education?

5. What favourable conditions are required for effective use/integration of educational technologies in classroom activities?
6. To what extent has the use of Educational technologies benefited teachers and students?

The above research questions were formulated from the comprehensive literature conducted and has been tested by the Collis & Hussey's model discussed above. However, some questions above were modified as the research process evolved. This is due to the importance of interaction between the researcher and the subjects of the study.

Table 5.2 below shows the relationship that exists between the research questions, the aims and objectives of the research as well as the themes that was gathered from the literature review. There is literature about educational technologies, as such; research questions 1, 5, 4 and 6 were formulated from the literature reviewed conducted, however, research question 2 and 3 was confirmed as the at the final stage of the research since it could be re-defined. The research questions presented in the Table 5.2 below are shown in different colours and these colours acts as a key to present the associations of these research questions to the aims/objectives as well as the themes gathered from the literature review.

Aims/Objectives		Research Questions		Themes
1- To conduct a comprehensive literature review on EduTech to understand its main concept and identifying the gaps		1- What are Educational technologies?		1- Education 2- Leadership in H.E
2- To identify the benefits and risks associated with the use of EduTech		2- What kind of EduTech do universities in Ghana mostly use?		3- Technology & Educational Technology
3- To explore the factors that aids in the implementation of ICT into classroom curriculum		3- What reasons did teachers/students gives for using or not using EduTech most often?		4- Advantages and Disadvantages of using technology
4- To develop a conceptual framework from the strand of literature for the possible factors that helps in successful implementation of EduTech in H.E		4- What consequences exist for using EduTech in Higher Education?		5- Strategies that contribute to technology's program success 6- ICT Implementation challenges
5- To identify various forms of EduTech employed by teachers and students in Ghanaian H.E system		5- What favorable conditions are required for effective use/integration of educational technologies in classroom activities		7- Planning for ICT 8- Digital Literacy
6- To suggest possible recommendation for effective implementation of ICT in education based on the research findings and conclusion		6- To what extent has the use of Educational technologies benefited teachers and students		9- Technology's effect on students' achievement 10- Pedagogical theories

Table 5.2: Development of Research Questions

5.8 STAGE 6: Research Strategies

Having stated our research questions above, it is therefore necessary to turn our attention to the choice of our research strategy. In general terms, a strategy is a plan of action to achieve a goal. Saunders *et al*., (2012), defined a research strategy as a plan of how a researcher would go about answering the research questions. Moreover, Denzin & Lincoln (2003) together with Collis and Hussey (2014) agree that a research design serves as the methodological link between the research's philosophy and the subsequent choice of methods to be employed in collecting and analysing data. It implies that a researcher's choice of research strategy would be shaped by the research questions and subsequently, the objectives of the study, the coherence in linking these to the researcher's philosophy, research approach and purpose, and also includes a more pragmatic concern about the extent of existing knowledge and time available to conduct the research work.

More to the point, different research strategies were considered before finally selecting the most appropriate and suitable for this research investigation. There was a case study, experiment, archival research, ethnography, action research, grounded theory and hermeneutics. Brief discussions on each are given below followed by the justification of the selected strategy.

Hermeneutics, according to Collis & Hussey (2014), is the type of methodology, which predominantly centres on the interpretation and understanding of text by virtue of the underlying historical and social factors. It was however not considered appropriate and suitable for this research investigation and thus not employed because this research does not seek to interpret historical texts. Lindlof (2001, p.31) also has this to say, that '*hermeneutics can be applied to any situation in which one wants to ''recover'' historical meaning'*. To Ricoeur (1977), this process involves incessant reference to the context.

Action research was also not adopted because this is a basic research we are investigating. According to Eriksson & Kovalaine (2014) and Collis & Hussey (2014), the action research is a type of methodology commonly used in applied research to uncover an effective way of bringing about a conscious change in a partly controlled environment.

Experimental research was also not adopted because the research understudy does not sit within the ambits of the positivist paradigm. This is the same reason for which survey methodology was also rejected. However, Collis & Hussey (2014) explained that experimental research could be associated with the positivist paradigm. To Bryman & Bell (2014), it is a methodology employed to examine the correlation between variables, where the independent variable is deliberately made to respond to the effect on the dependent variable. Saunders *et al*., (2014) also note that experimental research is conducted in a systematic way in laboratories or a natural setting.

Ethnography was also not considered suitable for this research because the researcher does not form part of the sample that would be studied but permitted to use socially acquired and shared knowledge to understand the observed pattern of human activity. The main process of data collection is participant observation, where the researcher becomes a full member of the group being studied (Parry and Boyle, 2009). It should be understood that the main methods for data collection for this study would be interviews and questionnaires.

Archival research was likewise not adopted because of its huge emphasis on the solely use of secondary data. This study under investigation attempts to explore new phenomenon, which will be hindered just by analysing secondary data. *Grounded theory methodology* was also contemplated, however, due to the systematic set of procedures in developing an inductively derived theory, it was decided that the findings would be restricted. Hence, grounded theory was rejected.

5.8.1 Case study research strategy

The discussion so far identifies a case study research as the appropriate methodology for this study. Robert Yin is the best-known exponent of case methods in the social sciences (Yin, 1994). Case study is a methodology that is used to investigate a single phenomenon (the case) in a natural setting using a variety of methods to obtain an in-depth knowledge (Collis & Hussey, 2014). Eisenhardt (1989, p. 534) refers to case study as the focus on ‘understanding the dynamics presented within a single setting’, whiles Bonoma (1985, p. 204) also pointed out that it must be ‘constructed to be sensitive to the context in which

management behaviour takes place'. According to Collis & Hussey (2014), the case may be an event, process, a particular business, and group of workers, person or any other phenomenon. Detailed information is collected about the chosen case although it is not restricted to just a case. More cases can be selected. This is termed as multiple case studies.

Yin (1994, p.18) defines a case study as an empirical inquiry that:

- Investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.
- Copes with the technical distinctive situation in which there will be many more variables of interest than data points.
- Relies on multiple sources of evidence, with data needing to converge in a triangulating fashion.
- Benefits from the prior development of theoretical proposition to guide data collection and analysis.

Notwithstanding the benefits derived from using case study approach, researchers from the positivist's philosophical position have levelled a number of criticisms against case study methods. They asserts that case study methods do not have the rigour of natural scientific designs; they rarely allow generalization to be made from specific cases to the general population; and they produce huge piles of data, which allow researchers to make any interpretation they want (Easterby-Smith *et al.*, 2014). In response to these criticisms, Yin (1994) advices that all case studies must have a clear designs produced before any data is collected. He further added that these designs should cover: the main research questions or propositions, the unit of analysis, link between data and propositions, and procedure for interpretation the data. When these are done, case study methods would contain the same degree of validity as positivist study.

This research involves four independent cases that were studied with regards to educational technologies serving as a typical example of a multiple case study. This is the most necessary and sufficient methodology for this research study as it allows the

researcher to freely select more than one case of interest to gather data within the subject area and present them in way that helps to formulate new conceptual theories. Four universities were selected from the Ghanaian Educational system – University of Cape Coast (UCC), University of Ghana (UG), University of Professional Studies (UPS) and Kwame Nkrumah University of Science and Technology (KNUST). Details of the four individual cases are discussed in chapter four of this study. This does not only offer the researcher the opportunity to give a detailed qualitative account of each cases, but also help to explore or describe the data in real-life environment and also help to explain the complexities of real-life situations which may not be captured through survey or experimental research. It is also worth mentioning that this study is exploratory case study. It tries to explore the phenomenon in the data, which serves as a point of interest to the researcher.

5.9 STAGE7: Research choices

Saunders *et al*., (2012) expressed that research under business and management could be commonly classified as either qualitative or quantitative research or both for the same investigation depending on the purpose of the study.

5.9.1 Qualitative research

In describing qualitative research methods, Hiatt (1986) explains that it stresses on discoveries and understanding the experiences, perspectives and thoughts of research participants. It explores meaning, purpose or reality. Denzin & Lincoln (2003, p.3) also stated that

> *''Qualitative research is a situated activity that locates the observer in the world. It consists of set of interpretive, material practices that make the world visible. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them''*

By a naturalistic approach, qualitative research seeks to appreciate phenomena in context-specific settings, such as "real world setting [where] the researcher does not attempt to manipulate the phenomenon of interest" (Patton, 2000, p. 39). Qualitative research, broadly defined, means "any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification" (Strauss and Corbin, 1990, p. 17). Its findings are arrived at from real-world settings where the "phenomenon of interest unfold naturally" (Patton, 2000, p. 21). Unlike quantitative research methods, which seek causal determination, prediction, and generalization of findings, qualitative research on the other hand seek illumination, understanding, and extrapolation to similar situations (Hoepfl, 1997).

5.9.2 Quantitative research

Qualitative research on the contrary argues that the methods used attempt to maximize objectivity, replicability and generalizability of findings and are characteristically interested with predictions (Guba and Lincoln, 1998). Integral to this approach, a researcher is expected to set aside all experiences, perceptions and biases to ensure objectivity in the conduct of the study with its final conclusions. Trochim & Land (1982, p.1) explicitly state that;

> *''A quantitative research method is the glue that holds the research project together. A design is used to structure the research, to show how all of the major parts of the research project—the samples or groups, measures, treatments or programs, and methods of assignment—work together to try to address the central research questions''*

Quantitative researchers deploy experimental methods and quantitative measures to test hypothetical generalizations (Hoepfl, 1997). Moreover, they emphasize on the measurement and analysis of causal relationships between variables (Denzin and Lincoln, 1998). By utilizing quantitative research methods in explaining social problems, Bogdan and Biklen (1998) note:

> *'Charts and graphs illustrate the results of the research, and commentators employ words such as 'variables', 'populations' and 'result' as part of their daily vocabulary...even if we do not always know just what all of the terms mean...[but]*

we know that this is part of the process of doing research. Research, then as it comes to be known publicly, is a synonym for quantitative research' (p. 4)

Quantitative research allows the researcher to get used to the problem or concept to be studied, and perhaps generate hypotheses to be tested. In this paradigm; (i) the emphasis is on facts and causes of behaviour (Bogdan & Biklen, 1998), (ii) information are recorded in numbers that can be quantified and summarized, (iii) the mathematical process is the norm for analysing the numeric data and (iv) the final result is expressed in statistical terminologies (Neuman, 2003).

5.9.3 Comparison between qualitative and quantitative research

In order to select the appropriate research methods for this research work, the argument of Corbetta (2003) was considered in the need for an effective comparison between these two approaches before choosing the most suitable. She proposed four distinct areas to consider for an effective comparison between qualitative and quantitative research methods. These are:

Theory-Research relationship- Qualitative research is mostly approached from the induction viewpoint, where theories emerge from observation unto a successful investigation of a research study. Conversely, quantitative research broadly takes shape from the deductive approach, where a theory initiates the study being tested (theory proceeds observation). As Chisnall (2011) puts it, quantitative research is most often linked to the positivist paradigm whiles Hughes (2006) also argues that qualitative research belongs to the Interpretivist paradigm since it addresses how the social world is interpreted, understood, experienced and produced. Punch (2008, p.328) explained that ''*the only research technique that is capable of identifying and handling complex interplay of emotions and attitude of people in a communal settings is the qualitative technique*''. More so, Corbetta (2003) opines that qualitative research is mostly open and interactive in nature whereby the research has the empathetic identification with the subject's standpoint. The position of Punch (2008) is that quantitative research is mostly structured, logical and developed in sequential phases with the researcher detached from what is being studied.

Physical Data collection- Quantitative research methods generally involves structured and closed questions, often presented as surveys or questionnaires (Collis & Hussey, 2014), whereas qualitative research methods appear unstructured and open which gets constructed during the course of the research investigation. According to Bryman (2014), techniques used in quantitative research includes surveys which are used to collate the perceptions of the larger sample group, whiles techniques such as interviews are used to collate sampling opinions of a focus group in the qualitative research study. Under quantitative research investigations, data collection generally involves a statistically representative sample as compared to qualitative research, which uses a single case without any statistical representation.

Data Analysis- Data analysis of a research project according to Oates (2014) involves summarizing the mass of data collected and presenting the resultant conclusions drawn in a way that communicates the most important features. Bazeley & Jackson (2014) expands this further under quantitative research analysis as involving summarizing the frequencies of variables, differences between variables, and statistical tests designed to estimate the statistical significance of the results (i.e. the probability that they did not occur by chance). All this is done basically by counting how often something appears in the data by comparing a measurement with others. At the end of the analysis, not only do we have a mass of results but we also have what we might call "the big picture": the major findings (Bryman & Bell, 2014). Conversely, a qualitative research data analysis technique seeks to understand the subjects under study to discover the bigger picture rather than just statistical analysis. Qualitative research data are usually designed and used to describe a phenomenon and to articulate what it means in order to understand (Eriksson & Kovalainen, 2014).

Production of results- So far, it will be unsurprising to expect generalization of results by the facts obtained in a quantitative study showing patterns and correlations in the form of tables and graphs (Corbetta, 2014). Nonetheless, qualitative research is mostly more specific as it focuses on a particular case. Excerpts and transcripts of interviews and narratives are often presented together with classifications and typologies produced as a result (Blaike, 2014).

5.9.4 Mixed method approach selected for this studies

Despite its significance, conducting mixed research methods are not easy as it requires lots of time and resources in collecting and analysing both quantitative and qualitative data (Saunders *et al*., 2014). Research methods become complicated and so the researcher must be guided to sort out these diverse procedures. Further, investigators are often trained in just one form of inquiry (quantitative or qualitative) but the mixed method requires that they know both forms.

However, due to the type of research questions of this study, the mixed method approach was adopted since values that might be gained will outweigh the potential complexity to this approach. Bryman (2014) stated that ‘‘*mixed methods research means adopting a research strategy employing more than one type of research method. The methods may be a mix or qualitative and quantitative methods, a mix of quantitative methods or a mix of qualitative methods*’’. This means that the researcher under this investigation employed both the qualitative and quantitative approach. The following are some benefits that researcher would gain by employing both methods.

- Mixed methods research provided the researcher a more comprehensive evidence for studying the research problem than any of both quantitative and qualitative research alone. The researcher was granted the use of all the tools of data collection available rather than being constrained to the types of data collection typically associated with qualitative research or quantitative research. In the nutshell, mixed methods research helped the researcher to answer questions that qualitative or quantitative approaches standing alone will not be able to answer.
- Mixed methods encouraged the researcher to collaborate, defying the sometimes-adversarial relationship that exists between quantitative and qualitative researchers. Mixed methods research encouraged the researcher to use multiple worldviews or paradigms rather than the usual association to certain school of thoughts by quantitative and qualitative researchers. It accepts paradigms that try to encompass all of quantitative and qualitative studies such as pragmatism, or using multiple paradigms in research

- Mixed methods research is “practical” in the sense that the researcher was free to use all methods possible to address a research problem and also because individuals are permitted to solve problems using both numbers and words, try to combine inductive and deductive ideas, and they (e.g., therapists) employ skills in observing people as well as recording behaviour. It comes across as natural then for individuals to employ mixed methods research as the preferred means of understanding the world.

5.10 STAGE 8: Time Horizon

Saunders *et al* (2014) pointed out that choosing a time horizon in research design is one of the most important factors and they distinguish between two main time horizons namely, *cross-sectional* and *longitudinal*. Collis and Hussey (2014) together with Bryman & Bell (2014) also concur to the two options of time horizons in research design.

5.10.1 Cross-sectional studies

Whiles Collis and Hussey (2014), suggests that cross-sectional studies is often used to investigate variables or a group of subjects in different contexts over the same period of time, Saunders *et al* (2012) describes these studies as a ‘snapshot’ of particular phenomena over a specific time frame. In simple terms, cross-sectional studies are conducted when there is a time constraint or limited resources, so, data for this particular research are collected once over a short period of time before they are analysed and reported. Cross-sectional studies normally will adopt quantitative techniques to collect data mostly through a survey (Oates, 2014). A major benefit of cross-sectional studies according to Easterby-Smith *et al* (2014) is that it is inexpensive and can be used simultaneously so that there is no problem of change taking place due to the passage of time.

Collis and Hussey (2014) however note that there are some associated problems with the use of cross-sectional studies. Firstly, it is very difficult to select a perfect sample that is large enough to represent the entire population. Secondly, it is a complex task to isolate the phenomena under investigation from all other factors that could influence the

correlation. Lastly, cross-sectional studies do not explain why a correlation exists; only that it does or does not exist.

5.10.2 Longitudinal Studies

The longitudinal research design, contrary to what the cross-sectional research studies say, is used to investigate variables or group of subjects over a long period of time (Saunders *et al*., 2014). Collis & Hussey (2014: p.64) argue that the 'aim of longitudinal studies is to examine the dynamics of a research problem by investigating the same variables or group of subjects several times (or continuously) over the periods in which the problems runs its course'.

Bryman and Bell (2014) explain that these observations are so repeated in order to reveal the relative stability of the phenomena under study. Eriksson & Kovalaine (2014) agrees with Collis & Hussey (2014) to the fact that it is very much easier to negotiate access and yet produce significant results from an inquiry in longitudinal studies than in cross-sectional studies due to the small sample size associated with longitudinal studies. But, once a longitudinal study commences, it must be continued although there is greater challenge of losing subjects during the course of study. Secondly, longitudinal research design is time consuming and very expensive.

Having briefly explained both research designs, the cross-sectional research design was adopted for this study's investigation because the 'snapshot' of the subjects under investigation needs to be examined within a particular time frame and also not forgetting a limited finances. Data concerning subjects under investigation was collected at once over a short period of time. This means the researcher under this investigation gathered the data from the participants at one point in time and not accessing data, which has already been collated from successive years.

5.11 STAGE 9: Data collection techniques

Researchers and scholars such as Bryman & Bell (2014); Saunders *et al* (2012); Eriksson & Kovalaine (2014) and Collis & Hussey (2014) all agree that there are two main approaches to collecting data for a research work. They categorized these data collection

techniques into primary and secondary data and argue that each of these two methods can further be put into several subdivisions to show which a particular researcher used meticulous one. Collis & Hussey (2014) among other researchers believe that there is no one way of data collection, which is superior to the other, but the researcher, ought to select the most appropriate one, necessary and sufficient in answering the research questions under investigation.

The next section will look into each one type of data collection technique in more detailed before selecting the most suitable one for this study.

5.11. 1 Secondary data collection techniques

In the social sciences, it is permissible to use already collected data by other researchers for even other purposes, such as official statistics, administrative records, or other accounts kept routinely by organizations (Bryman and Bell, 2011). These types of data are known as secondary data because they have been previously acquired and made available for current use. This concurs with Easterby-Smith's (2014) definition, which explains that, secondary data are data, which have been already collected for purposes other than the problem at hand.

However, Blaike (2014) argues that secondary data poses a number of characteristics problems. Researchers must first locate data sources that may be useful for own research problems. Secondly, they must be able to retrieve the relevant data and lastly, it is imperative to assess how well the data meets the quality assurance of the current research and the methodological criteria for a good scientific practice.

The secondary data gathered and collected for the research investigation has been shown in chapter two of this thesis. The scoped of the literature review conducted was influenced by the research objectives aligned to achieve the research questions and aim of the study. The researcher under this investigation concluded on six research objectives deemed relevant to achieve the research's aim. These objectives were confirmed and agreed upon during UKAIS 2015 & 2016 conference presentation, together with SPARC conference organized by the Salford Business School in 2016. As shown in Table 5.2 under section 5.7.1, the research objectives were all linked and matched to the study's

research question in colours showing how all the research themes were arrived at. The research theme therefore shows the scope of the literature reviewed covered.

5.11.2 Primary data collection techniques

Primary data are facts originally collected by a researcher for a specific research investigation (Collis & Hussey, 2014). In other words, the researcher must personally gather this information because no one has compiled and published it in a forum accessible to the public. Primary data are current data, original in nature and directly relates to the issue. Some organizations and researchers will normally take time to allocate the resources required in gathering primary data only when a question, issue or problem presents itself sufficiently important or unique to warrant such necessary expenditures (Saunders *et al*., 2012). Some major sources of primary data are interviews, observation, focus group, questionnaires, survey and case studies.

5.11.3 Selected data collection techniques for this research

The researcher under this investigation made use of both the primary and secondary data collection techniques. In collecting the secondary data, the researcher reviewed several existing literatures on educational technologies to be informed about the study's area and help avoid unnecessary duplication of ideas concerning the subject area. The review included a range of different literature sources - including academic papers, reports on research and initiatives in the public, private and third sector, research carried out by government bodies, policy, monitoring and evaluation reports and materials aimed at supporting the practice of teaching and learning. The greatest interest for reviewing the various literatures on the study's area was motivated by Blaxter *et al* (2006: p.34) who states that '*much secondary data by default should be reviewed before any primary research is done since it keeps the researcher well informed about works already done about the topic and to avoid duplication of knowledge*'.

The researcher made use of primary data collection techniques. This kind of data was mostly observed or collected directly from first-hand experience. Primary data was used because it is necessary to collect first-hand information to make this study more original. The actual source of our primary data for this study was in the form of observations,

interviews and the use of questionnaires. Sections below explains these primary data collections in more detailed

5.11.3.1 Interviews

An interview is a method for collecting primary data in which samples of respondents are asked questions to find out what they think, do or feel about the research problem under study (Collis and Hussey, 2014). This definition was also supported by Arksey and Knight (1999, p. 2) who further pointed out that, 'under the interpretivist paradigm, interviews are concerned with exploring 'data on understandings, opinions, what people remember doing, attitudes, feelings and the like, that people have in common'. Interviews are conducted with individuals, or groups, using a variety of methods. Each method has different strength and weaknesses. It is often recorded with audio recorder for sound quality or other mobiles phones. Cost is often an important factor and the best method for a particular interview depends on the size, location and the accessibility of the targeted sample. Depending on the researcher's objectives, interviews could be conducted through face-to-face, telephone or online.

5.11.3.2 Interview Preparation for this study

Interviews were conducted among lecturers at four universities in Ghana and leaning/educational technologists from the United Kingdom. These interviews were conducted as semi-structured interviews. The researcher prepared a list of questions from the literature review based on the research problem; time was given to the interviewee to express other views to accommodate new ideas that came up during the interview. Apart from one educational technologist who agreed to Skype interview, all other interview was conducted through face-to-face medium.

The planning of the interviews also involved couple of formal steps that were taken to address issues arising from data protection, confidentiality and informed consent. University of Salford require all students undertaking research with human participants approved in an ethical-review process, as such this research has gone through the required process and has been approved with ethical reference number '**140061'.** This means that permission to conduct the research has been gained from Salford University. Letter of introduction (see appendix J) and consent form (see appendix E) which details

how the confidentiality of the respondents are protected, were given to the participants to read and understand and signed to confirm that they were informed about the research and its expected benefits ahead of data collection. Section **5.14** explains all ethical considerations observed in the study in more detailed. Below are the justifications for selecting the targeted samples for the study

- **Lecturers**: These are the qualified persons in their respective selected universities who have been trained to deliver teaching practices to students. The purpose for interviewing these persons is to discover whether they employ any educational technologies in their teaching deliveries and the associated issues that come with it. See appendix B for survey questions for teachers
- **Learning/Educational technologists**: This group is made up of persons who are strongly involved in managing, researching, and encouraging the use of technologies in the classroom for teaching and learning. They will be selected on an international scale. The rationale behind interviewing these persons is to discover and understand the issues surrounding the introduction of technologies into the classroom. See appendix A for survey questions for educational technologists

5.11.3.3 Time and location of the interviews

Interviews were conducted among 20 lecturers (5 from each case study university in Ghana) and five educational/learning technologists from the UK. The interviews for the teachers in Ghana commenced from the 1st to 31st of October 2016. All the interviews for the teachers took place at their respective offices. The researcher first coordinated with majority of teachers from each four university's business school in advance about the convenient time and place. Each interview for the teachers took approximately 15minutes. The interview for one educational technologist was conducted via Skype; whiles the other four took place at the interviewee's office. The interview for Educational/learning technologists lasted approximately 20 minutes.

5.11.3.4 Mode of selecting respondents

The initial idea was to give the researcher's cover letter, consent form, ethical approval and participant's information sheets to head of department for approval and subsequently

forward an email to all lectures at the business school to give them an overview of what the research is about. However, majority of the heads for department were not found at the time of the research.

The researcher was keen on selecting the interviews from different programs of teaching, age, gender and culture. Hence, the researcher was able to distribute the cover letter, consent form, ethical approval and participant's information sheets to most lectures found in their offices for approval. Most lectures accepted the invitation to be interviewed for the research investigation. However only five interviewees from each case study university, were used for the study due to the repetition of responses given by other interviewees (Thus 20 interviewees in total). After each interview conducted, images were taken with some lectures upon their given consent. The image together with singed consent form has been placed at the appendix G of this study.

5.11.3.5 Interview questions

The initial Interview questions contain 15 open-ended questions, which were presented to the interviewees for the interview. The responses given by the interviewee's answers other questions on the survey questions. The researcher therefore grouped the responses of other questions into one question's answer. This led to the final survey been drafted to only 11 questions presented in table 5.3 below. The definitive questions selected for the main question are presented in table 5.3 below: 4 less than the initial questions. . The original interview questions presented to participants are shown in appendix of this thesis. The layout of the main Interview questions contains relevant demographic questions as indicated in the appendix B.

5.11.3.6 Demographic Information of the Respondents

The interview conducted began with some demographic information, which highlights the basic characteristics of the interviewee. Five demographic questions were added to the interview questions and these are; Gender, Age group, Program of teaching, Qualification and Teaching experience at the university.

Table 5.3: Main survey questions

	Main Survey Questions
1	What is the difference between Education and learning?
2	How can you define the concept of 'technology'?
3	What are Educational Technologies (EduTech)?
4	What EduTech do you use regularly in your classroom activities?
5	Do you think the use of EduTech increases student's performance?
6	Do you attend seminars, conferences or any training and development programs, which enhances your use of EduTech in teaching?
7	What other factors are needed to be successful/improve your chances of using EduTech in teaching activities?
8	What are if any, possible consequences of using EduTech in teaching and learning?
9	Do you think EduTech would displace the teacher in the future?
10	In your opinion what is the overall effect of EduTech usage on student's academic performance?
11	How do you view the future of higher education in Ghana?

5.11.3.7 Questionnaires

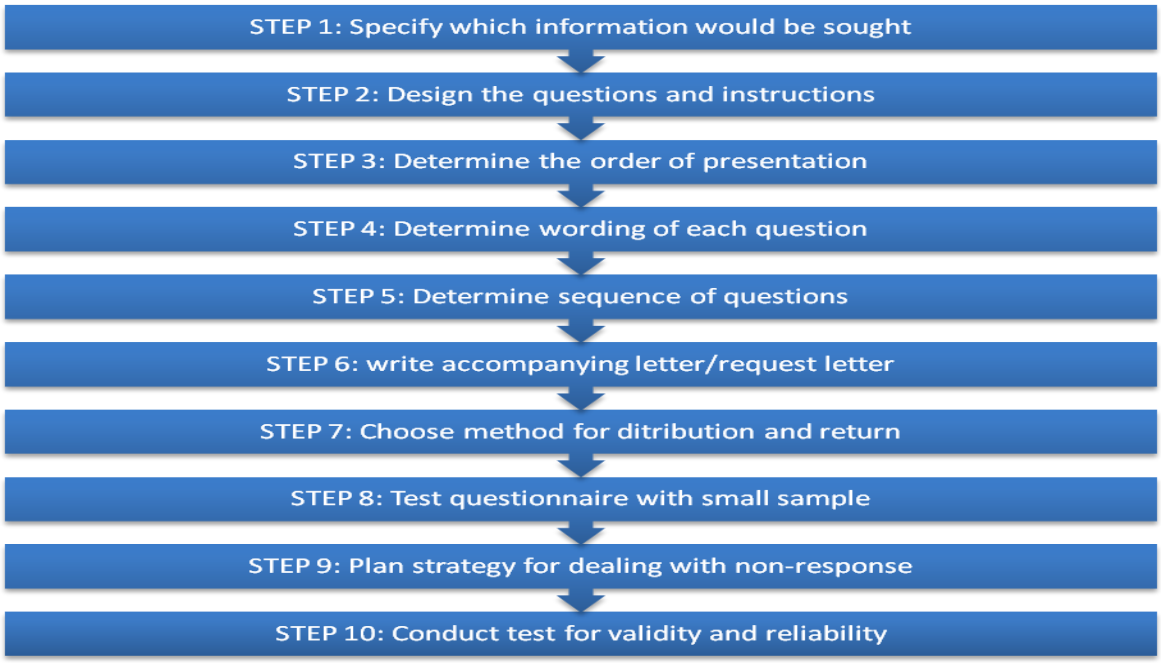
Another source of primary data for this research is the use of questionnaires. A questionnaire is a set of pre-defined set of questions, assembled in a pre-determined order (Saunders *et al*., 2014). Put differently by Collis & Hussey (2014), a questionnaire is used as a method of collecting primary data in which a sample of respondents are asked a list of carefully structured questions chosen after considerable testing, with a view to elicit reliable response (Oates, 2014). This study employed the combined process of questionnaire development attributed to Churchill & Lacobucci (2014) and Collis & Hussey (2014), which consist of ten, steps (see figure 5.5 below).

This is done to ensure that the research's aim and objectives are greatly achieved. The Churchill & Lacobucci questionnaires development process served as the principle for generating the questions used for this research investigation. The questionnaire was

pretested before it was finally used as a survey instrument to solicit for data. The questionnaire for this study was administered to students from four universities selected for this study. Students were selected for this study because they are one of the most important stakeholders in the educational setting to which this study concerns. Students had the opportunity to share their views on technologies used outside classroom activities; as well as the ones been used in the classroom by their respective teachers. Their perception about educational technologies would was unravelled. See appendix C for questionnaires administered to students.

It is very important to note that the efficacy of results by respondents depends on the quality of the questionnaires and interview questions designed. The questionnaire together with the interview questions should be well planned and designed in an accurate way to bring out the best most reliable results. This is where Peterson (2000: p.12) states that '*the quality of the information obtained from a questionnaire is directly proportional to the quality of questionnaire, which in turn is directly proportional to the quality of the construction process*'.

Figure 5.5: Questionnaire development process



Source: Churchill & Lacobucci (2002) and Collis & Hussey (2014)

5.11.3.8 Designing of main survey questions

The researcher gathered all the pilot questionnaire after been administered to students and the results revealed that some questions were answered whilst others were left unanswered. It is assumed that most students left some questions unanswered due to the complexity of terms used; hence those particular questions unanswered were amended to make it simple for students to understand whilst maintaining the actual meaning to same questions. From the pilot investigation, question number 6, 8 and 22 were amended, by providing possible 'answer options' to students. The pilot contained a total of twenty-two questions, but the researcher added extra three questions to the final survey questions making twenty-five questions. Out of the twenty-five questions, five questions were demographics of the respondents, and the other twenty questions arranged in sections about EduTech.

The twenty-five questions contain five open-ended questions and twenty closed-ended questions which were design from the themes that emerged from the literature review in view to achieve the study's aims and objectives. Several researchers supported the use of both open-ended and closed-ended, questions by the researcher. According to Gill & Johnson (2010), the use of open-ended questions helps the researcher to gain in-depth knowledge and better understanding of complex issues about the topic area understudy.

Oates (2006) further explained that, from the researcher's perspective, closed-ended questions are very easier to 'tick' (answer), and this helps to reduce the actual chances of non-response. Malhotra & Birks (2007) also supports this assertion by pointing out that questions for survey must be straightforward to answer and avoid having more than one meaning. Sue & Ritter (2012) also pointed out the important of sequence of the questions been design by the researcher. Hence, question 16 and 19 from the pilot survey was moved to number 18 and 21 in the main survey respectively. The questionnaire contains three pages of questions, which saves respondents time to answer. The research finding supports Gillham (2000) who argues that, number of pages is a very important factor in getting good results from respondent. Gillham (2000) proposed that at most six pages are the usual tolerance maximum when designing a questionnaire. See appendix C for the main survey questions used for the study.

5.11.3.9 Demographic Survey findings

The demographic of the respondents simply describes the profile or characteristics of the selected respondents for the research study. Information captured with regards to the demographics of the respondents is gender, age, university attended, program of study and level of study. It is important to note that demographic questions vary according to the research conducted and the type of respondent's researcher's aims to select. This would split the respondents into groups and shows how their categorization affect answers given in a research.

5.11.3.10 Administration of main survey questionnaire

As with much research study, collecting of data is very important. However, during the data collection process, several aspects come into play such as the actual cost of selected data collection method, the accuracy of the data collected and the efficiency of data collected (Collis & Hussey, 2013). Despite the popularity and rise in the use of online and telephone surveys, the researcher under this investigation employed face-to-face (in-person) administration of questionnaire to students at the Business School at case study universities in Ghana. Even though several researchers (Oates, 2013; Blaikie, 2013; Bryman & Bell, 2013) argue that face-to-face questionnaire provides high cost (cost of printing hard copies of questionnaire) and time consuming to the researcher, Collis & Hussey (2013) believe that it offers high response rate and the opportunity for the researcher to explain any complex issues to respondents to allow better response. Furthermore, it provided the researcher the opportunity to hand over new copies of questionnaire to respondents when needed.

School authorities confronted the researcher, to provide evidence of student's candidature; the researcher provided letter of introduction (see appendix J), consent (see appendix C) and participant information sheet (see appendix D) explaining the purpose of the research understudy. Due to the large sample size (100 from each four university), the researcher trained two extra persons to help in the administration of questionnaires to students at the various universities. Therefore, the researcher with other two trained individuals stood at vantage points and shared the hard copies of questionnaire to students at selected universities. The researcher administered more than the required number of questionnaire to students to make room for any margin of error with regards to wrong filling of

questionnaires by students. The answered questionnaire were all collected and put into an envelope and sealed by the researcher.

5.11.3.11 Research sampling technique

This section describes forms of sampling designs that are available to the researcher. Sampling refers to the process of selecting a fraction from an entire population of interest for the ultimate purpose of drawing general conclusions about this population from which the fraction was chosen (Oates, 2014). Authors such as Saunders *et al* (2012) and Collis and Hussey (2014) classified sampling techniques into probability sampling (forms of sampling design where the probability of each entity being part of the sample is known) and non-probability sampling designs (the probability of any member of the population being sampled is unknown).

This is very necessarily a common practice because the researcher in this instance cannot cover or investigate the whole university population of interest due to financial and time constraints. The researcher for this investigation used the purposive random sampling technique in drawing his sample.

The researcher from the start of the study indicated that the study is a business research, hence the need to only invite participants from the business schools of the selected case sample. In other words, the researcher has a clear idea of what sample units are needed according to the purpose of the study, and then approaches potential sample member to check eligibility criteria. The researcher did not give any student the chance to refer to a friend who also meets the selecting criteria. Without any form of discrimination, this process gave all business students an equal chance of being selected for this study.

5.11.3.12 Selected institution for the study

Four university institutions in Ghana were purposely selected for this study. The choices of these research sites were based on the requirements of the project to get representative institutions across the educational system, and across geographic locations. The researcher further had interaction with members of the National ICT Policy and Plan Development Committee and officers of the National Science Resource Centre in Accra, and that informed the decision to select the institutions involved in the study.

Furthermore, in view of time constraints on the team, consideration of proximity and access to the universities also influenced the selection of these sites. More detailed overview of each selected case study university is given in chapter 4 of the study.

5.11.4 Data analysis

Data that was collected for this study was qualitative and quantitative in nature by employing the use of questionnaires and interviews. The process of data analysis for the qualitative research is non- numeric, as such the researcher under this investigation is required to organize the data collected, sort them out and break them into several units. The researcher discovered patterns, which are important to the study and finally gathered all findings. It is important to note that all interviews were tape recorded and later transcribed to bring out meaning. These transcribed data was inputted into NVIVO software for analysis. Data collected from the use of questionnaire was inputted into SPSS for analysis.

The questionnaire was administered as hard copies to the selected students and the responses were collected. The responses from the questionnaire were manually entered into SPSS software for analysis. The researcher first of all, entered all the questions together with its responses into the SPSS software. The researcher used the responses from the software to draw pie and bar charts to show patterns from the responses given by students.

The SPSS software enabled the researcher to present the responses in a simple, well-structured manner to make it easier to understand. The NVIVO software on the other hand helped the researcher to arrange the interview findings in themes, which aided the researcher in presenting interviewees' responses in a more presentable manner.

The next section will focus on reliability and validity in both the qualitative and quantitative approaches. Adequate measures will be taken to ensure this research study is valid and reliable.

5.13 STAGE 10: Validity and Reliability

At this stage of the study, the research had gone through all of the processes needed in analysing data collected and results presented. It is however important to note, that, for this research investigation to be meaningful, the outcome or result of the study must be valid. If the outcome does not measure what the researcher intends to investigate then the results cannot be used to address the main aim of this study, the research question (Collis & Hussey, 2014). It cannot also be used to generalize any findings and becomes a waste of time and effort. In order to ascertain how appropriate, useful and meaningful a research is, it is very important to ensure its validity and reliability (Blaike, 2014).

5.13.1 Research's Reliability

Joppe (2000, p. 1) defines reliability as: 'The extent to which results are consistent over time and an accurate representation of the total population under study is referred to as reliability and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable.' Collis & Hussey (2014, p. 52) also define reliability as 'the accuracy and precision of the measurement and absence of differences in the results if the research is repeated'.

A common feature to the definitions above is the idea of same results even when repeated irrespective of whoever is conducting it. However, there are three key points according to Bryman & Bell (2015, p. 48), which is widely accepted that characterizes reliability in any quantitative research study. These are: (1) *the degree to which a measurement, given repeatedly, remains the same* (2) *the stability of a measurement over time*; and (3) *the similarity of measurements within a given time period.*

5.13.2 Research's Validity

The traditional criteria for validity are traced to the positivist practice. By implication, it could mean that positivism is to an extent defined as a systematic theory of validity. To the positivists, validity was a thing inherent and was as the result of culmination of other empirical conceptions: universal laws, evidence, objectivity, and mathematical data to name just a few (Winter, 2000). Joppe (2000) describes in the following explanation what validity is in quantitative research:

> *'Validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are. In other words, does the research instrument allow you to hit "the bull's eye" of your research object? Researchers generally determine validity by asking a series of questions and will often look for the answers in the research of other'* (p. 1)

If the issues regarding reliability, validity, trustworthiness, quality and rigor are meant to differentiate a 'good' research from a 'bad' one, then testing and enhancing them in a research investigation will be of much importance in any of the paradigms.

5.13.3 Reliability and validity of this research

There are numerous ways to check for validity and reliability of a given research paper as discussed above but the researcher tested them using the main methods of data collection (questionnaire and interviews) used for this study.

5.13.3.1Questionnaires

The process of designing questionnaires for this study is summed up in the figure 5.5 above showing the type of question, their wording and the order in which they are presented. This section explores how the validity and reliability of the questionnaire was tested. First and foremost, the researcher in an introduction letter (or covering letter) explained the rationale behind this study to clarify the context in which these questions are being asked. This was done in simple language to easily convey the actual meaning of this research project to the layman (respondents) in return for an honest response. Contents were taken from literature/theoretical frameworks to generate statements/questions for the questionnaire. A link was then established between the objectives of the study and their translation into content.

5.13.3.2 Pilot testing

Pilot test was conducted at the starting phase of the data collection process. Pilot study constitutes the mini versions of the full-scale research study. In other words is takes into consideration the specific pre-testing of particular research instrument, which in this case is the questionnaire and interview schedule. This is also called the feasibility studies (Creswell 2007; Lincoln & Guba, 1985).

It is that which assisted the researcher to refine the questions, evaluate its validity, ensure data collected matches research questions and assist in developing the final version of the survey (Collis & Hussey, 2014). One of the advantages of conducting a pilot study is that it gave the researcher advance warning about where the main research project could fail, where research protocols may not be followed, or whether proposed methods or instruments are inappropriate or too complicated. In the words of De Vaus (1993: 54), "Do not take the risk; Pilot test first". The wording and the order of the questions, the range of answers on multiple-choice questions were also piloted. In addition, the different ways of distributing and collecting the questionnaires were also tested. Results of the pilot study have been fully discussed in chapter 6 of this thesis.

5.13.3.3 Member checking

Furtherance to ensuring the validity of this study, the researcher employed member checking as second technique. Member checking is primarily used in qualitative inquiry methodology and is defined as a quality control process by which a researcher seeks to improve the accuracy, credibility and validity of what has been recorded during a research interview (Barbour, 2001; Byrne, 2001; Coffey & Atkinson, 1996; Doyle, 2007; Lincoln & Guba, 1985). Member checking is also known as participant verification (Rager, 2005), informant feedback, respondent validation, applicability, external validity, and fittingness (Morse *et al*., 2002).

First and foremost, after the questionnaire or interview questions were designed, the researcher conducted pre-test. Under the pre-test, the questionnaires were given to experts in the field or researchers working in similar research domain to critically evaluate each question. This provided great assistance to the researcher in improving the questionnaire where necessary. The questionnaires were also sent to the research supervisor and other academic supervisor from the University of Salford to confirm the validity of each question.

Another kind of member checking for this study was conducted during the interview process. The researcher transcribed and summarized the information given by the respondents and then questioned the respondents to determine accuracy. During this process, some participant disagreed that the summary does not reflect his/her views,

feelings and experiences, amendment were then made. However, some participants also affirmed accuracy and completeness, leading to the credibility of the study.

Whether the member checking occurs simultaneously during the interview or near the end of the project, these member checks are not without fault. However, they serve to decrease the incidence of incorrect data and the incorrect interpretation of data, with the overall goal of providing findings that are authentic and original (Creswell, 2007; Moustakas, 1994). The greatest benefit of conducting member checks is that it allowed the researcher the opportunity to verify the accuracy and completeness of the findings, which then helped to improve the validity of the study (Cohen & Crabtree, 2006).

5.13.3.4 Peer debriefing

In the field of social sciences research, qualitative researchers seek to understand the world through the perspective of others. This approach yields useful and highly in-depth information regarding people's motivation, concerns and behavior (Brigham and Joanning, 1999). Peer debriefing requires the researcher to work together with one or several colleagues who hold impartial views of the study. The impartial peers examined the researcher's final report and general methodology, and feedback was given to enhance the credibility and ensure validity.

With this regards, the researcher attended 2015 UKAIS conferences during the starting phase of the research study (See appendix I for confirmation of attendance), and the SPARC 2016 during the middle stage of the study. Dr. Peekay Richardson, Senior Lecturer at the University of Manchester Business School also validated the findings of the study. This provided close collaboration between the researcher and external reviewer to offer constructive criticisms about the study and offer further and better ideas where necessary.

5.14 Ethical Issues in Research

Most researchers agree that research investigation in the social sciences is most often associated with collecting and gathering data from human beings (Oliver, 2010). Almost inevitably, some concerns are raised over the manner in which participants selected for a research should be treated and acknowledged by researchers. Such concerns are most

often ethical in nature. As a result, the social sciences research community is increasingly becoming more sophisticated over the past few years in the way it considers such ethical issues as the ethical dimension of planning and implementing research outcomes appears to be gaining ground (Oliver, 2010).

'Ethics' could simply be defined as the principles or actual moral values that basically form the basis of a code of conduct (Collis & Hussey, 2014). Ethical issues usually arise at various stages of business management research (Bryman & Bell, 2014). Researchers must endeavour to carefully take into account all possible research values in order not to comprise the findings of the research (Saunders *et al*., 2012). In this section, great focus shall be given the research ethics, which is primarily concerned with the actual manner in which the research under investigation is conducted and how findings or the results will be reported.

Bryman & Bell (2014) further argue that there is no basis to ignore or disregard research ethics on any grounds since they directly relate to the integrity of any piece of research inquiry and the disciplines involved. Blaike (2013) in agreement adds that research ethics clearly depicts the moral integrity of the researcher, being a very important factor of ensuring that the research process, as well as its findings is all trustworthy and valid.

5.14.1 Ethical considerations during this research

Simply put, in all research investigation involving the collection of data from human beings, there is a fundamental moral requirement to treat those people in accord with standards and values which affirm their essential humanity (Collis & Hussey, 2014). This research context is really no different in this respect from any other context in which human interaction takes place. The following would systematically show how various research ethics for this research were observed.

5.14.1.1 The ethics of recording data

There is arguably the closest form of interaction between the respondents and the researcher during the data collection phase of the research investigation (Collis & Hussey, 2014). Ethical issues are generated during such situations. Most of these ethical issues could be predicted, while others arise spontaneously during the process of data collection

and gathering (Oliver, 2015). One of such issues, which could arise spontaneously, is recording data and this normally raises significant ethical issues (Oliver, 2015).

In recent times, the structured or the semi-structured interviews conducted by most researchers are tape-recorded. Videotaping could sometimes be used to during this process, and most often possess an added advantage to be able to record physical gestures and expressions of the interviewee. Somehow most investigation of this kind, however, makes use of some form of simple audio-taping. Note taking during this time cannot ensure the same degree of accuracy of recording the actual words spoken by the interviewee.

The first ethical issue about recording data that was observed is the informed consent of the selected participants that was obtained. The researcher during this period explained to the participants the actual reason to tape record the interview process, the actual way in which the recordings would be used, the way in which the tape would be stored, and the procedure for destruction of the tapes when all the data have been successfully transcribed. Then also, participants were informed about the particular way in which they will be identified on the tape.

It is highly acknowledged, that sometimes the use of tape recorder during interview process of the research may be very intimidating and some participants may feel very worried about very sensitive information they may wish to provide. During this time, the researcher placed the tape or disc recorder within the reach of the interviewee, and explained to them before the start of the interview that they had to use the pause button at any time. In other words, the participants selected for the interview were given absolute control over the recording process. During this stage, the interviewees were advised that at any particular point in time they could press the pause button in order to have time to reflect. They will also be able to stop the recording during the session if they so wish.

Lastly, the researcher under this investigation provided the opportunity to play back the tape at the end of the interview for the interviewee to listen. If at any point in time the interviewee feels that some of what they have said does not reflect their real feelings, or is not expressed as accurately as they would like, they could amplify this with further

discussion. They can either add to the tape recording to try to explain their views more clearly, or select some words and sentences that should be deleted from the recording.

5.14.1.2 The rights of respondents to end involvement in the research

Arguably, it is part of the principle of freedom and autonomy inherent in taking part of research study that participants should feel to withdraw at any time (Oliver, 2010). Under this researcher investigation, participants would have to give their informed consents; however, they cannot necessarily be expected to anticipate their feelings about participation. This means that the participants cannot fully anticipate that they will find the experience during the research very stressful or enjoyable, hence, each selected participants was given the autonomy and freedom to end and withdraw from the research at any time he or she wishes. During the start, participants were given the Information sheets (See Appendix D) and consent form (See Appendix E) to read and give their consent respectively. Participants were reassured that they can withdraw from the research at any point in time should they find the experience very awful. Participants had no penalties for not continuing and were not also brought under pressure to continue in the research process.

5.14.1.3 The disclosure by respondents of sensitive information (Privacy, anonymity and confidentiality

During the collecting of data, participants resulted in discussing or sharing sensitive information with the researcher. The cornerstone of this research is that participants were offered the opportunity to have their identity hidden in the research report. However, there were cases where selected participants preferred that their identity be given in this research investigation because of the advantages in the associated publicity. This was only considered when participants gave their consent to such course. This means that under this research investigation, any participant who wished to remain '*anonymous*' was allowed. This was the greatest assurance the researcher gave to the participants that they would not be named in the research findings. This allowed each participant to respond to each question from his or her perfect point of view.

Furthermore, protecting '*confidentiality and privacy*' of information given by the respondents is one of the biggest ethical issues that was observed. The researcher under

this investigation did not under any circumstance disclose any information given by the respondents to the general public, unless otherwise given consents to do so by each selected participants. Sensitive information that was obtained solely for this research investigation was protected to allow for the participant's privacy rights to be duly protected. Additionally, there was explicit statement about people who will have access to the data provided by the respondents, it was clear about the people who will be able to read and scrutinize the data provided.

The participants were informed about the plans to retain the data, and providing access to other researchers during the period. Additionally, the findings or the outcome of this research investigation was preserved for the sole purpose of academic research. On the grounds that the findings of this study would be publicized, respondent's views were sought to avoid '*misuse of findings*'. It is also important to note that, prior to this research investigation the researcher has completed all requirements in relation to ethical approval for the PhD study as required the University of Salford.

5.15 Conclusions

The primary aim of this chapter is to highlight and provide the significance for selecting suitable research methodological path to conduct this research investigation. There is a growing interest in the business and management research; hence significant attention has to be given to explain the various methods employed to justify the overall claim that there is contribution to knowledge (Easterby-Smith *et al*., 2014).

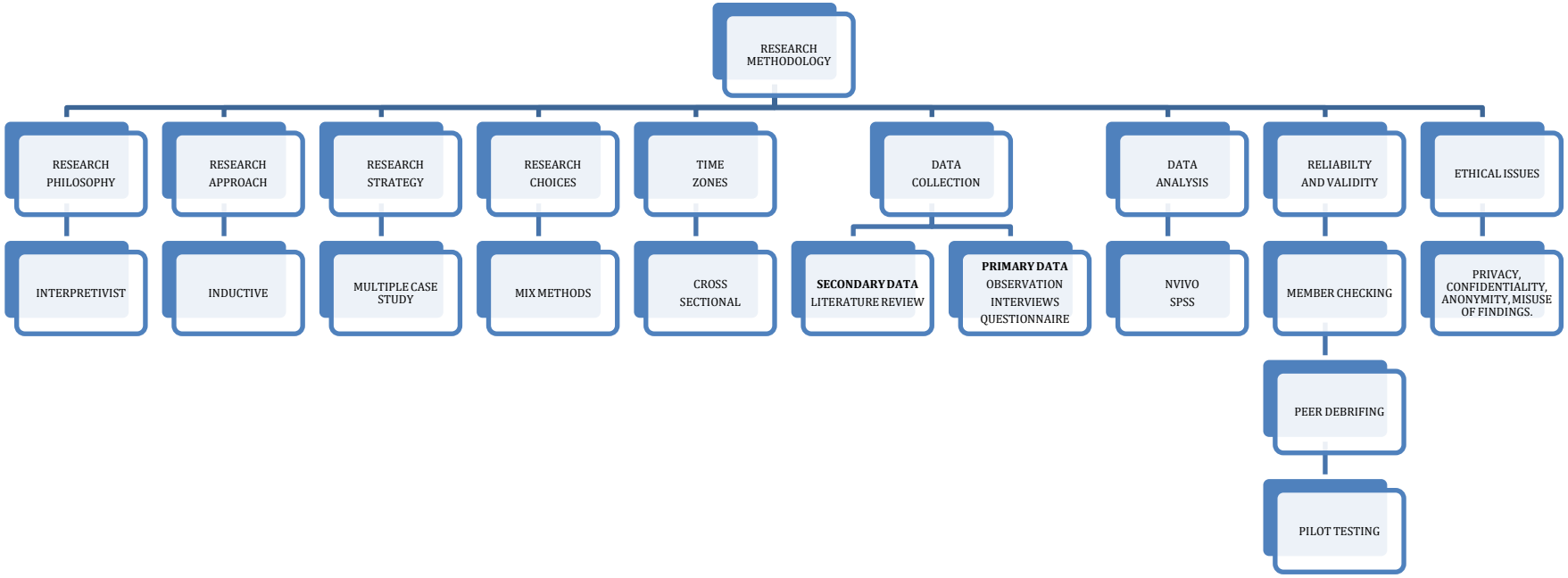
This research study employed the interpretivist philosophical stance to build a theory from the final findings and conclusions. The researcher under this investigation employed mixed methodological approach; however, qualitative approach was heavily relied. The researcher employed both qualitative and quantitative approach because it is seen as the best way to investigate educational technology in the Ghanaian educational setting in its natural setting.

The researcher has also justified the selection of students, tutors, and educational technologists as the most important stakeholder in the Ghanaian educational sector. The use of multiple case studies has also been justified to investigate educational technologies

through series of interviews, observations and questionnaires. The process to ensure validity and reliability of the findings has also been describe above, and lastly, the due process has been described above to provide the medium to observe all ethical considerations arising in the course of conducting this research investigation.

In summary, the overall methodological path employed by the researcher has been illustrated in figure 5.6 below.

Figure 5.6: Researcher's methodological path



Chapter 6 - Pilot Investigation

6.1 Introduction

In Chapter five the methodological pathway that was employed for the research to be undertaken was presented. In same chapter, the researcher provided the data collection techniques by specifying questionnaire and interview as the main method of data collection for the investigation. In order to substantiate the various approaches that was used and data collection tool employed, the researcher addressed any unexpected issues that would be faced during the main research project by conducting a pilot investigation.

A pilot study, according to VanTeijlin & Hundley (2001) is a mini-version of the full-scale study or the trial of the all the preparations for the complete study. This is what Blaxter (2013) referred to as the 'feasibility' study. This means that, the pilot study commenced after the researcher has a clear vision of the research objectives and topic, the various methods that would be employed, and what the schedule for the research would look like. The pilot study for the current investigation was carried out, by mainly trying out all the adopted research techniques and also of questionnaires and interviews. As a novice researcher, the pilot study helped to identify ambiguous or unclear items in the questionnaire. The non-verbal behaviour of selected participants or discomfort experienced concerning the content or wording of items in the questionnaire helped the researcher to modify those questions.

6.2 Designing of Pilot Study

The current research was an exploration investigation; hence questions were design to explore the nature of educational technology usage in Higher Education context. Starting questions were design to ensure that schools participating in the pilot successfully met the criteria and identified as a Higher Education institution. This was portrayed in the demographic information collected from the selected participants. This was followed by series of questions that were designed on the following nine themes that were arrived at

from the literature review: Educational Technology, Role of leadership, Implementation of EduTech, Benefits of EduTech, Risk of using EduTech, Training and development, Concept of learning, Availability of resources and the future of EduTech in H.E. More importantly, each question in the pilot investigation was perfectly linked to the research aims and objectives presented in the introductory chapter of this thesis (Chapter 1.0).

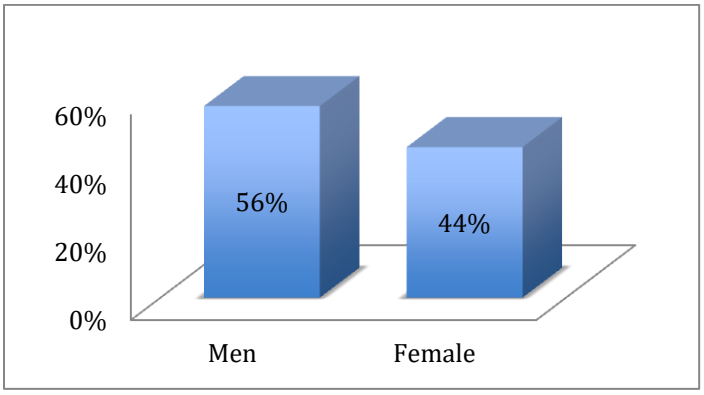
In total, the pilot consisted of twenty-five questions with the feedback from the selected participants on the research design. Due to the exploratory nature of this investigation, the pilot consisted of mainly quantitative questions with only seven questions being qualitative to gain much insight into the participant's perspective with regards to the use of Educational Technology. The closed ended questions ensured that the pilot was easy for the selected participants to complete effortlessly and to provide the opportunity to analyse trends and patterns. Appendix F contains the pilot questions employed and the manner in which they all relate to the research aims and objectives together with the nine themes identified from the literature review.

6.3 Pilot Administration

The pilot investigation for this research project commenced on 1st of August 2016 and ended on 10th of September 2016. The results, analysis and conclusion of the pilot study are presented below. 50 participants were surveyed from two different universities for the pilot investigation. The selection of the pilot case universities was influenced by the geographical location of the researcher.

6.4 Results of Pilot Data collected

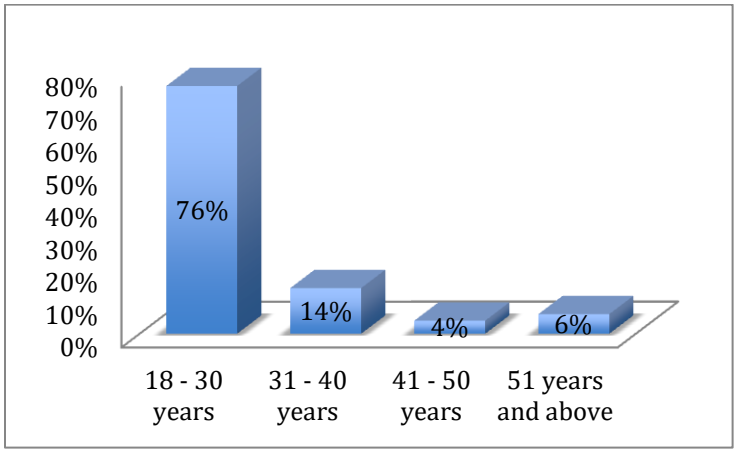
Question 1: (Figure 6.1) What is your gender?



Analysis and Interpretation – From the chart above, 56% (28) of the selected participant represents males, whilst 46% (22) were female. All participants ticked the appropriate area for the answer of this question.

Design Reflection – It is evidently clear that the question was very simple to understand and that enable all participants to easily tick their answers. This very question was maintained for the final investigation.

Question 2: (Figure 6.2) Please tick the number that represents your age

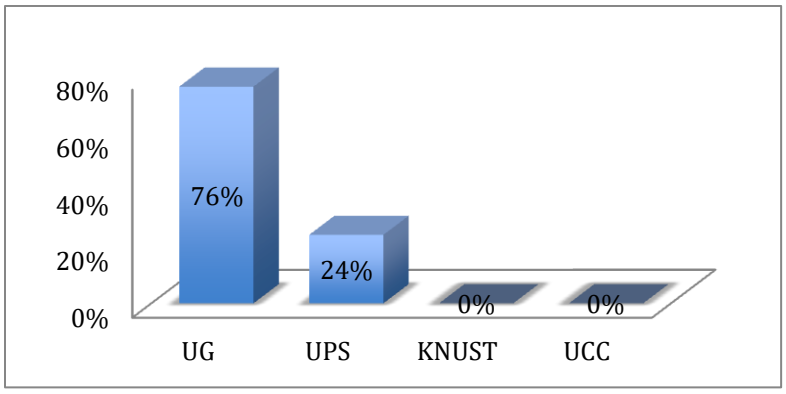


Analysis and Interpretation – 76% (38) of the selected participants were between the age group of 18-30 years, 14% (7) were between the age group of 31-40 years and 4 % (2) and 6% (3) were between the age group of 41-50 years and 51 years and above

respectively. The results shows that majority of students at the higher education are in their youthful ages.

Design Reflection – All participants understood the question well and ticked where appropriate, hence the final survey contained same question.

Question 3: (Figure 6.3) which university do you attend?



Analysis and Interpretation – 76% (38) of the selected respondents were from University of Ghana whiles 14% (12) were from University for Professional Studies. This means that only two universities were selected for the pilot investigation.

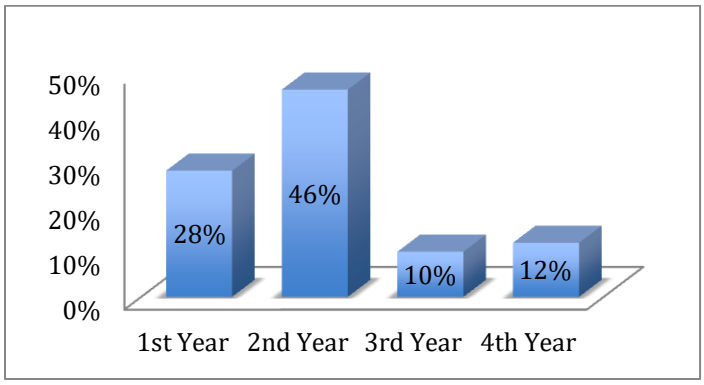
Design Reflection – Since different universities were selected for this research investigation as justified in chapter 4 of this thesis, the results of the pilot investigation shows that only two universities were selected for the pilot study and all respondents understood the question and answered appropriately. This question would be remained for final survey.

Question 4: Which program are you studying at the university?

Analysis and Interpretation – 78% (39) of the selected sample were studying Marketing, whilst 20% (10) and 2% (1) were studying Human Resource Management and Accounting respectively.

Design Reflection- Participants experienced no difficulty in understanding the question; hence no changes were made to this question, since all participants answered correctly all the questions.

Question 5: (Figure 6.4) Which level are you on your program of study?



Analysis and Interpretation – Majority (46%) of students (23) selected for the pilot investigations were in second year of study. 28 % and 10% were in first year and third year of study. Only 12% (6) were in their final year of study. However, two of the students found it difficult to answer this question, as their level of study were not found as possible answers for the question.

Design Reflection – Two participants experienced difficulty in finding their level of study since the possible options for answers only portrayed undergraduate programs of study. The final survey had another option for postgraduate level of study for students who do not fit into the four categories of answers in the pilot.

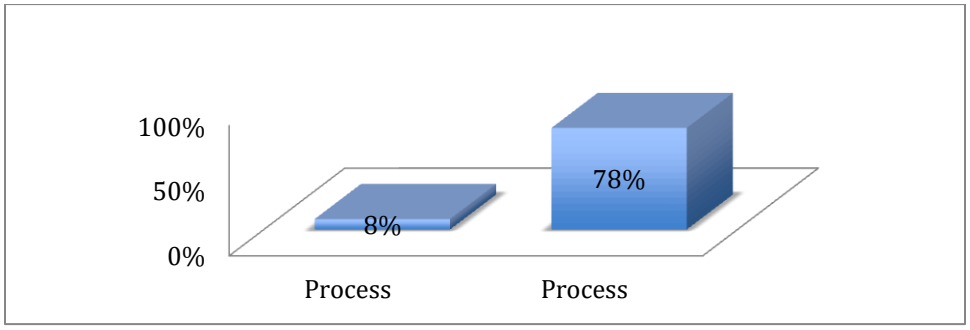
Question 6: How can you define the concept of technology?

Analysis and Interpretation – The results from the pilot investigation revealed that all 50 students selected defined technology as a 'tool' that aids production process. They further indicated that technology is all available 'gadgets' that makes work very 'simple' and 'faster'. This explains that these selected students for the pilot investigation view technology as only 'an end product' rather than a process. However, the literature review also indicated that technology could be seen as a product or a process.

Design Reflection – The final survey for this question contained options of some definition of technology collated from the literature review. This would give students

ideas about different perception about technology with regards to it been a process or an end product as contained in the literature review.

Question 7: (Figure 6.5) In your opinion technology is a/an a) process b) end product



Data Analysis and Interpretation- Majority **(**78%) of students indicated that they view technology as a 'product'. Perhaps, most students view the 'computers', 'laptops', 'scanners' and other physical gadgets they use as the bigger component of technology. Only 8% also indicated that technology from their perspective is a process. However, the literature review gave a fair balance and definition of technology, which consist of both product and process; and this was in agreement with 14% who indicated with a written answer to add that technology consist of both process and product.

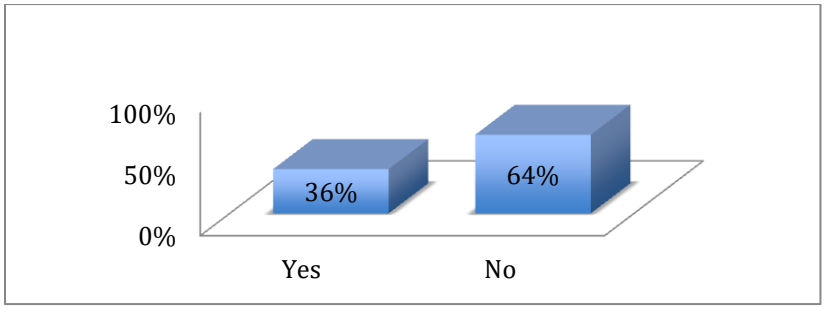
Design Reflection- In the main survey, there should be the definition of technology with optional answers, which could later inform the decision to indicate whether technology is a process or an end product. Furthermore, the researcher added a third optional answer to be both 'process and product'.

Question 8: What is Educational Technology?

Analysis and Interpretation – The majority (97%) of students selected for the pilot study only relate to Educational technology as 'computer' and 'projectors'. Only few (3%) defined the term as videos in teaching and learning. The results indicate that majority of students do not have wider meaning of Educational technology. There was difficulty in defining the term 'educational technology' even though they have idea what is it.

Design Reflection – Perhaps definition of Education Technology needed to be included to help respondents make informed choices to this question. This is important, as it will give majority of students the actual meaning of the term, which could be what they have in mind. When students understand the key terms of the questionnaire, right answers would be given as their answers. The final survey therefore included various definitions of Educational Technology as gathered from the literature review in Chapter Two of this thesis for students to tick the appropriate answers.

Question 9: (Figure 6. 6) Is there any Educational Technology available at the university?



Analysis and Interpretation – 88% of the respondents (44) demonstrated a meaning of educational technology by stating that the university has in its capacity some technologies that aids in teaching and learning. Only 12% (6) disagreed with the availability of any educational technology at the university. The researcher however, observed during the pilot study the existence of whiteboards and markers in the all two schools visited for the pilot study.

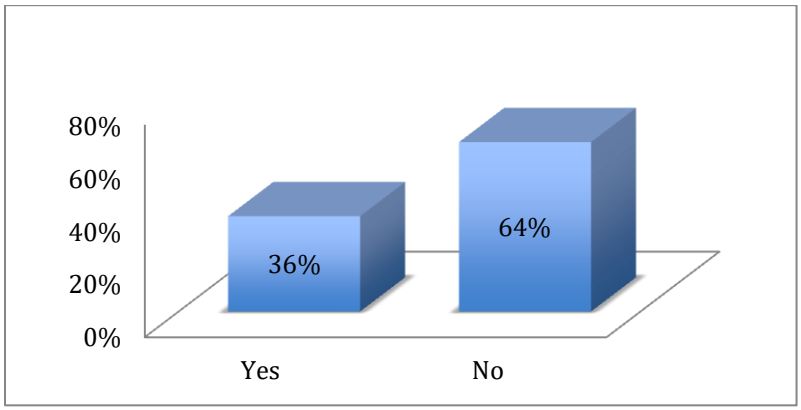
Design Reflection –More detailed information and options of types of educational technologies for students to 'tick' were added in the final survey. This is because the literature review highlighted some educational technologies for teaching and learning to which whiteboards and markers are inclusive.

Question 10: If yes from (9) state the available educational technologies at the university

Analysis and Interpretation – Overall, there were lots of educational technologies stated by majority of students selected for the pilot investigation. Examples of educational technologies stated by these students are: Computers & Laptops, Software packages, Projectors, Whiteboard, Internet, Makers, Flip Charts, Printers, Scanners, Microphones & Speakers, Social media communication (e.g. Facebook, YouTube, Skype and Twitter) and Local resources like pen and calabash for demonstrating

Design Reflection – This is a clear question that was used in the main survey investigation since students were able to name some types of educational technologies, which were in agreement with the types found in the literature review of the thesis.

Question 11: (Figure 6.7) Are the available educational technologies in good condition for use?

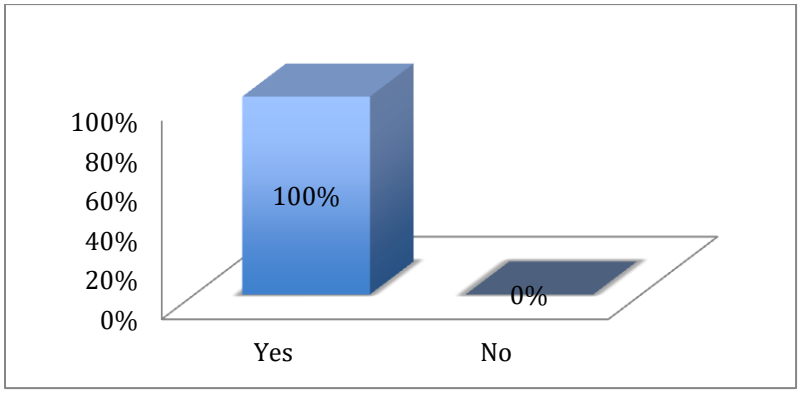


Analysis and Interpretation – Majority (64%) of the students selected for the pilot study stated that the available technologies at their various universities are not in good condition. Only 36% (18) of these students agreed to the fact that these technologies available are in good shape for teaching and learning.

Design Reflection- In the main survey investigation, there were several statements as the optional answers for students to 'tick' as their answers. This is because the word 'good condition' could be relative and vary from each student's perspective. Giving students statements that best describes how their respective technologies operates (working

perfectly) in schools would be important to bring out a clear meaning to the shapes (condition) of the technologies.

Question 12: (Figure 6.8) Do you use any kind of Educational Technology in classroom learning?



Analysis and Interpretation – Overall, all (50) respondents selected for the pilot study demonstrated equal knowledge of using one EduTech or the other in classroom learning. This means that during classroom learning, all the students employ technology in learning.

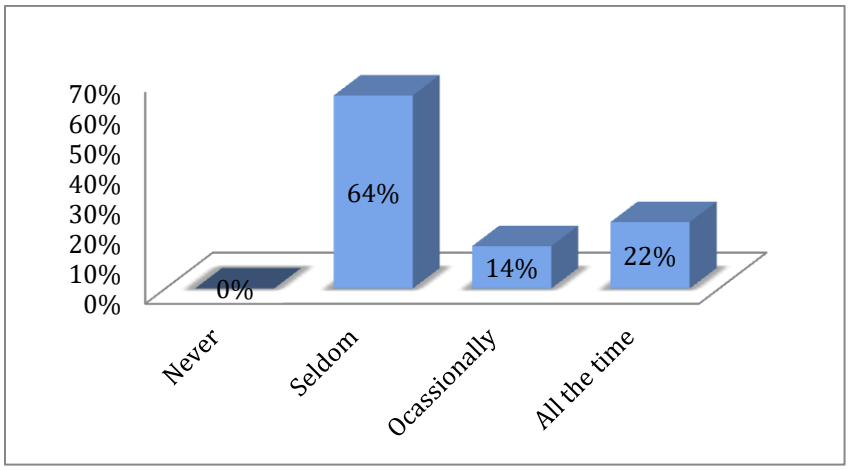
Design Reflection – This is a clear question that was maintained in the final survey because all students answered in by 'ticking' the answer effortlessly.

Question 1:. If yes from (12) state the kind of educational technology you use in classroom learning

Analysis and Interpretation – All 50 students stated the types of educational technologies they use in their classroom learning. The following are some technologies that were mentioned by students: Internet, Mobile phones, Computers and laptops, Microsoft office, YouTube and Software

Design Reflection – This question is clear to all respondents, hence was used in the final survey.

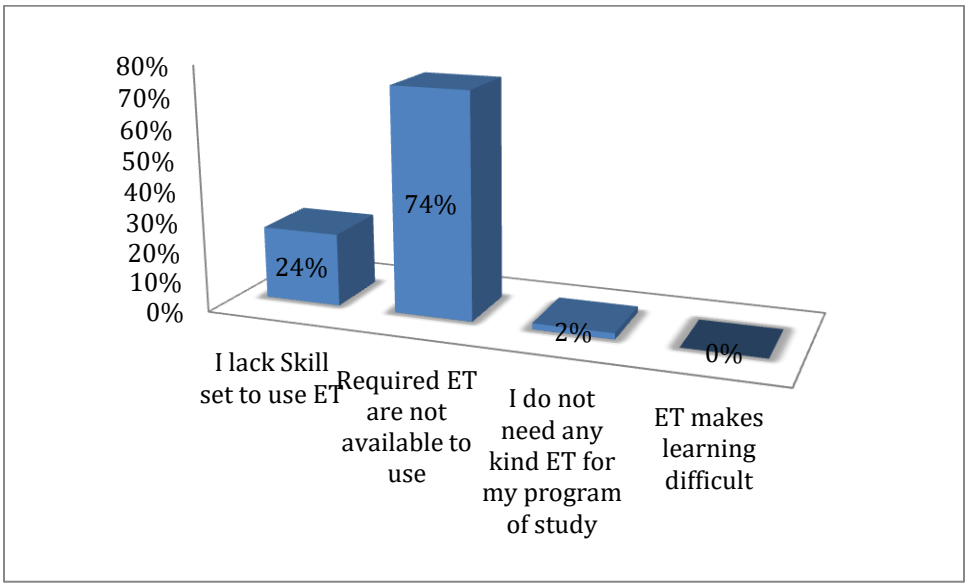
Question14: (Figure 6.9) How frequent do you use educational technologies in your learning activities?



Data Analysis and Interpretation – With regards to how frequent these students use any king of educational technologies, majority (64%) of the students stated that they often use these tools for their learning activities. 22% and 14% of the students stated that they use these tools 'all the times' and 'occasionally'. None of the students disagreed with their daily use of any technological tool for learning.

Design Reflection – The response rate to this question shows that all respondents understood with ease the meaning of the question, hence was used in the final survey.

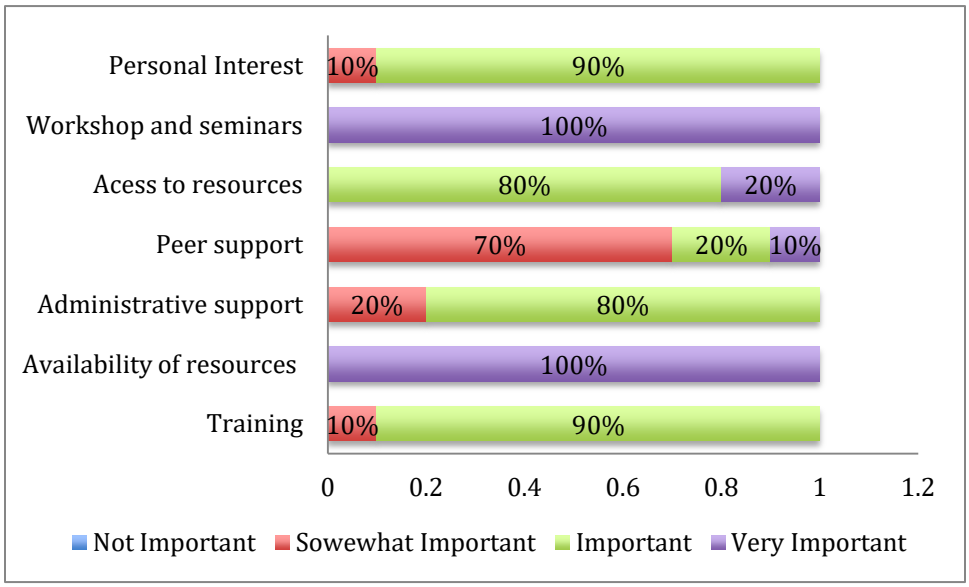
Question15: (Figure 6.10) I do not use educational technologies often because:



Data Analysis and Interpretation – 74% (34) of the students indicated that there are no required educational technologies available for them to use. The results also show that 24% (12) of the students also indicated that they lack the knowledge and skills in using the technologies for any academic use. Even though no students indicated that EduTech makes learning difficult, only few (2%) they do not need any kind of EduTech for learning. This could be as a result of the type course under study.

Design Reflection – This is a clear question, which was used in main survey. However, there would additional options for students to provide others factors, which are listed in the provided answers.

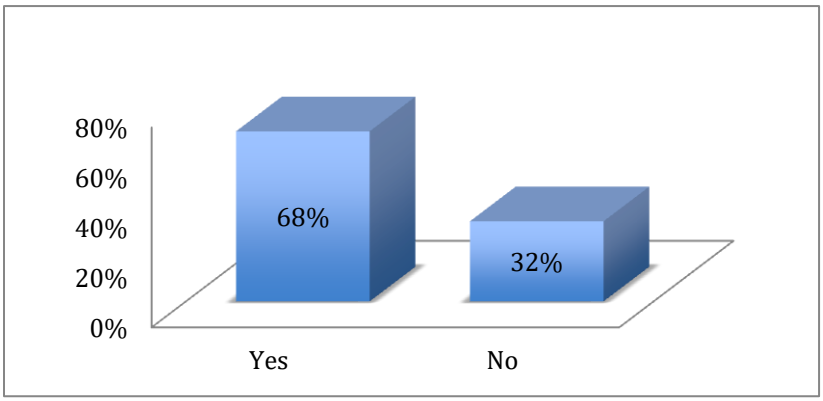
Question 16: (Figure 6.11) How do you rate the importance of the following factors in influencing your use of Educational technology?



Data Analysis and Interpretation – All 50 (100%) students indicated availability of resources and workshops/seminars are two 'very' important factors to influence the use of educational technology. Perhaps the seminars would identify which technological tools are important, that's why 90% of the students later indicated that training is the next important factor need. Specific training would be given to students and teachers having identified their required technological tool, followed by training how to use these tools to learn. 80% also indicated that administrative support is also an important factor in influencing the use of technologies in the classroom. 70% of the students found factors such as peers support and personal interest somewhat important.

Design Reflection – The results indicated the clarity of the question to students as all students answered this question. Hence, this question was maintained in the final survey.

Question 17: (Figure 6.12) Is there any training programs organized by the university to support students with the use of educational technologies?



Data Analysis and Interpretation – From the results 68% (34) of the students agreed to the fact that their respective universities organize workshops and training programs to support students with the use of educational technologies. Only few (16) students stated that there are no organized training programs to support the use of technologies for their learning activities.

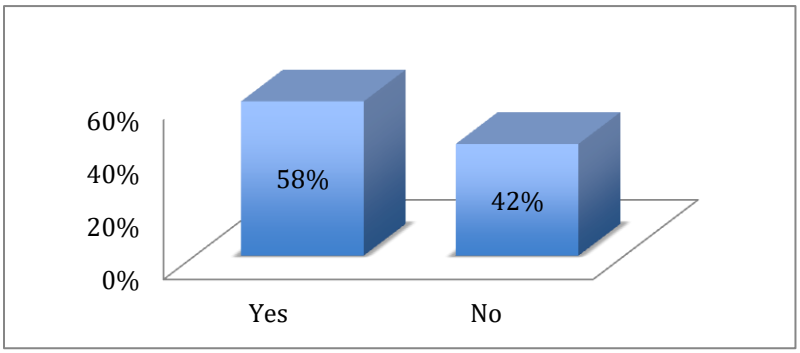
Design Reflection – This is a clear question and was maintained in the final survey.

Question 18: What do you think are some benefits of using educational technologies?

Data Analysis and Interpretation – From the results, all 45 students stated several benefits of using educational technologies, such as a) makes teaching and teaching easy, b) for better understand and c) helps in research.

Design Reflection – The outcome of this question proved that students at the university are aware and able to write some benefits of using technologies in learning; hence this question was maintained in the final survey.

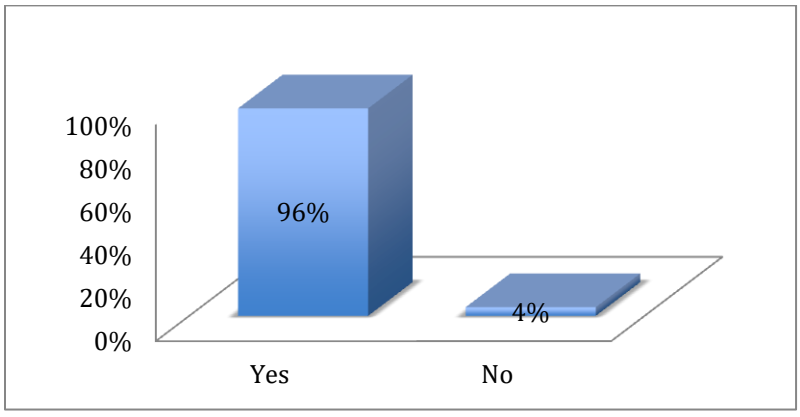
Question19: (Figure 6.13) Are there any consequences of using educational technologies in learning?



Data Analysis and Interpretation – 58% of the students indicated that there are some risks or consequences in using educational technologies in learning. 42% of the entire 50 students selected for the pilot project also disagreed to that fact; by saying there are no consequences in using educational technologies in learning.

Design Reflection- This question was maintained in the final survey since it clear for student to understand. No student left this question unanswered.

Question 20: (Figure 6.14) Do your tutors employ any kind of educational technology in teaching?

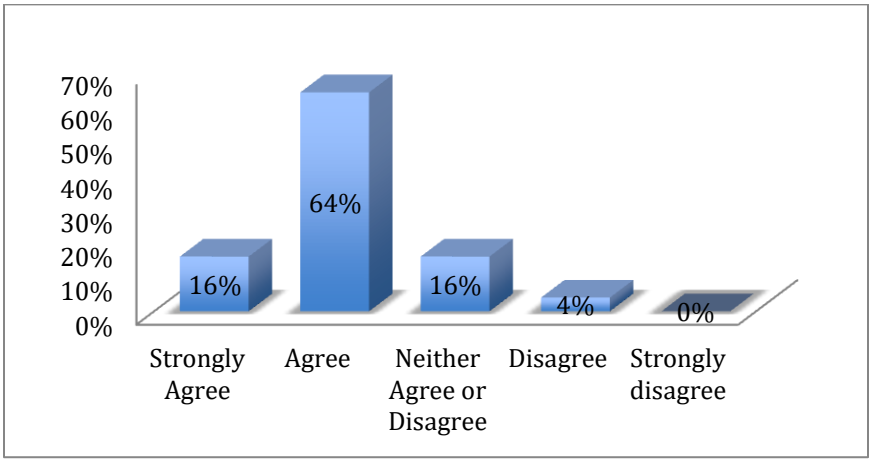


Data Analysis and Interpretation – Overall, 97% (48) of the selected respondents selected for the pilot study stated that tutors in their classroom teaching employ educational technologies to enable students in their learning activities. However, 4% (2) disagreed to the fact that their tutors employ any kind of educational technologies in their

teaching deliveries. This results suggest that majority of the students have an idea of what constitute educational technology, since from the researcher's observation almost all the universities in Ghana employ microphones and white boards.

Design Reflection - The response rate is very perfect, hence this question was maintained in the final survey.

Question 21: (Figure 6.15) Overall, the use of educational technology has improved your learning process?



Data Analysis and Interpretation- from Question 11 above, all 50 students indicated that they all use educational technologies in their learning activities. Out of the 50 students, 16% (8) strongly agree that educational technology usage has improved their learning process; whilst majority (64%) 32 also 'agree' that educational technology usage has improved their ways of learning. However, 16% of the students were indifferent about how educational technology has improved their learning processes. Only 4% (2) 'disagree' that the use of educational technology has improved her learning processes.

Design Reflection – This would a suitable question for the main survey, although it could be more detailed on how EduTech has improved students learning process.

Question 22: How do you view the future of Higher Education in Ghana?

Data analysis and Interpretation – Majority of students left this question unanswered, whilst only 3 students indicated that the future of H.E in Ghana is very 'promising'. It is clear students' needs further clarification on the meaning of the question.

Design Reflection – with the vast information provided by the literature review with regards to the wind of change blowing on the educational system, on how traditional way of teaching and learning are been transformed, respondents were provided such information to help understand the question so as to give their opinion in the final survey.

6.5 Pilot Investigation Conclusion

The results from the pilot investigation partly supports the literature review of this thesis exhibiting that students across the universities have a wide knowledge on educational technological but with regards to those tools they have in their possession and use in their learning activities. The pilot illustrated some importance students place on educational technologies and the kind of technology they employ in learning activities both inside and outside the classroom.

The pilot investigation also identified that most teachers in the HE employ forms of technological tools in their teaching deliveries. 96% of the students indicated that tutors use educational technologies in their teachings. It also emerged that; even though students employ these technological tools in learning majority are aware of the consequences or danger in relying on these tools. This was illustrated where 57% indicated that there are consequences in using educational technologies in learning.

The Pilot investigation went on smoothly with the proposed methodological pathway indicated by the researcher; hence no changes were made to the research methodological approach employed.

6.6 Pilot Design Conclusion

The analysis of the pilot results indicated that there were some issues with respect to difficult questions, which respondents could not answer. The feedback from the pilot requires that the researcher provide some additional information on possible choices to students to select from. There were some questions that were irreverent during the pilot study and were deleted from the main survey. There were other questions that were realized during the pilot study and were added to the main survey due to its relevance to the research question and aims and objectives.

6.7 Summary

The pilot investigation has provided valuable information with regards to the questionnaires been used and the approached employed by the researcher. The necessary action would be taken by the researcher to effect all changes that are needed. After making all the amendment to the questionnaires, the next chapter presents the findings of the main research survey. This means that the design of the main survey was informed by the findings of the pilot study and also from the feedback from interim assessment and internal evaluation conducted by the University of Salford.

Chapter 7.0: Survey Investigation

7.1 Introduction to chapter

The preceding chapter provided the analysis and interpretation of the pilot study. The results and findings that emerged from the pilot study helped the researcher to maintain and re-design some aspect of the main survey questionnaire for the research study. Therefore, this chapter presents the analysis and interpretation of the main survey investigation. It starts by exhibiting the design of the main survey, the process of administering the survey. Results of the individual case study are presented and the overall discussion of findings among the four individual case studies is presented illustrating the correlation of research findings to the literature review conducted.

7.5 Survey Analysis

Sue & Ritter (2012) explain that researchers must extensively consider the actual method of data analysis before collecting research data. Gillham (2000) asserts there are two main stages for the data analysis process. To start with, Gillham (2000) pointed there is the presentation of charts and graphs (descriptive stage), and second stage is the discussion, analysis and interpretation of results. On the other hand, SSC (2001) also believe there are three main stages of data analysis, namely exploratory analysis, deriving of the main findings and conclusion drawn. Bryman & Bell (2013) also argue there are other series of quantitative analysis of data from univariate analysis where a specific individual variable can be analysed to a wide exploratory technique where tables and graphs are systematically presented and analysed. The viewpoint provided by Gillham (2000) has been adopted for this study. The results are presented in tables and charts formats, followed by interpretation and analysis of the data for each question. Conclusions are drawn for each individual case study and the overall discussion of findings for the four selected universities is presented.

The following sections provide the data analysis and interpretations of the individual case studies selected for this research investigation. It provides a full analysis on University of Ghana (UG), Kwame Nkrumah University of Science and Technology (KNUST), University of Cape Coast (UCC) and University of Professional Studies (UPS). The overview of each university has been provided in chapter (4) of this thesis. The analysis of each case study university takes the form of presenting the findings followed by the summary of outcome.

7.6 Findings for University of Ghana (UG)

7.6.1 Introduction

The researcher administered 107 questionnaires to students at UG Business School as hard copies to solicit for the views of students with regards to the use EduTech at the university. Out of the 107 hard copies of questionnaire administered, only 99 were rightly answered and used for this study. The researcher, due to unanswered questions and the 'ticking' of both 'Yes' and 'No' for same questions discarded 9 questionnaires. The questionnaires were administered on 21st October 2016 between 10am to 3pm at UG Business School (main campus). The following sections present the demographic information about the respondents and the perceived views on EduTech.

7.6.2 Demographic Information

Question 1 (UG): Gender of Respondents

Interpretation - The results of this questions show there is no significant difference between male and female at the UGBS. Out of the 99 respondents, 43% are females whiles 57% are males. This means majority of the students were males. This is illustrated in figure 7.1a at appendix L. This is evidence, which shows the increase of male child education in Ghana than females.

Question 2 (UG): Age Distribution at UG

Interpretation - The outcome of the investigation at UG shows that 55% of the respondents are within the ages of 18-25 years. 45% were also within the age group of

26-33 years. No one was within the ages of 34- 41, 42 years and above. As shown in the sub-Saharan Africa, most students at UG are in their 'youthful' age studying for their Higher Education. This is illustrated in figure 7.2a at appendix L

Question 3 (UG): University Attended

Interpretation - Since the study consists of 4 different case studies, this question helped the researcher to select students from UG from others. All 99 students randomly selected for this study attends UG business school.

Question 4 (UG): Program of Study

Interpretation - This question helped the researcher to know all the various business programs studied by the selected respondents for this investigation. Several business courses of study emerged as compared to other cases (universities) for this research study. 48% of the respondents studies Bachelor of Science (BSc) Business Administration in Accounting, 13% studies BSc Business Administration in Banking and Finance, 4% studies BSc Business Administration in Health Sector management, 9% studies BSc in marketing, 7% studies BSc Business Administration in Public administration and 18% studies BSc Business Administration in Finance. The outcome of the investigation shows that majority of the student's studies Accounting followed by finance at UG business school.

Question 5 (UG): Level of study

Interpretation - The outcome of the investigation shows that, majority (49%) of the students, are in their third year of study. 21% of the students are in their second year of study, whilst 19% and 11% are in their first and final year of study respectively. No students selected for this study, were studying for a postgraduate program. This is shown in figure 7.3a at appendix L.

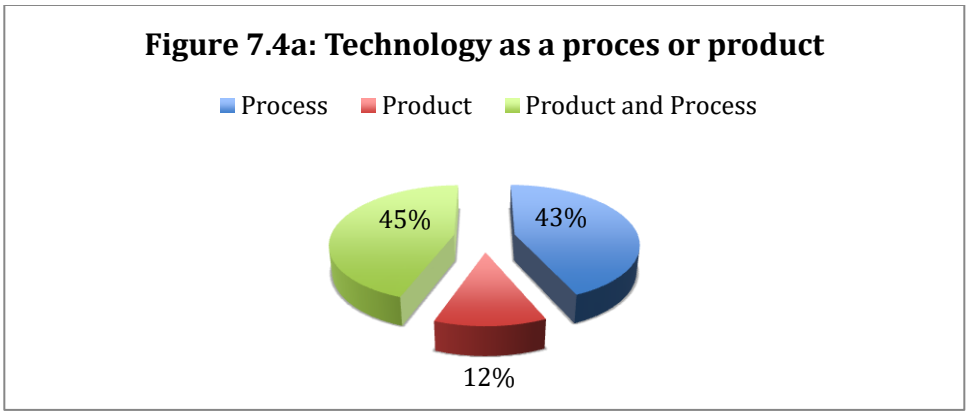
7.6.3 Educational Technology and Teaching & Learning

Question 6 (UG): Definition of Technology (Tech)

Interpretation - This question aided the researcher to gather a general idea on the definition of the concept of Technology from students at UG. From the study, 62% (Consisting of all 49% of third year students) of the students indicated their perceived meaning to the concept of technology as 'the development and application of tools, machines, materials and processes that help in solving human problems'. 11% of the students also indicated that technology is 'the application of scientific principles to solve practical problems'. 26% (consisting of all 19% of First year students) of the students also claimed technology is 'the process by which human modify nature to meet their needs and wants. The results indicate the ***level of study*** has significant influence on the definition of technology. It could be observed all first year students indicate the simplest meaning of technology by expressing that technology 'is the process by which human modify nature to meet their needs'. Furthermore, all 49% of third year students also indicate a little more complex and advance meaning to technology as 'the development and application of tools, machines, materials and processes that help in the solving of human problems. This explains students who are nearing the completing stage of their H.E have wider and matured understanding to the term technology.

Question 7 (UG): Technology as a process or product or both

Interpretation - The outcome of the question 6 above shows that majority (62%) of students at UG view technology as a process and a product, however, 12% of the students indicated technology is considered a 'product' whilst 43% (Consisting of all 11% of first year students) view technology as a 'process'. This is an indication that there is a shared meaning to the conception of technology among students at UG. 44% of the students also believed that technology consist of both process and product. There is no significant different between categories of students who selected technology as process and those who also indicated that technology is a product. The results show that ***level of study*** influences the perception of what constitute technology. This is shown in figure 7.4a below.



Source: Field survey, 2016

Question 8 (UG): Definition of Educational Technology (EduTech)

Interpretation - This question gave students at UG the opportunity to express their respective views on the concept of EduTech. 37% of the students indicated that EduTech 'any physical approach by which educational instructions is presented to school learners'. 50% also indicated that EduTech is 'the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources for teaching and learning'. 12% also indicated that EduTech is 'the tools, machines and materials that helps in teaching and learning'. This is an indication that majority of students at UG have a clear idea of the concept of EduTech. This would greatly help in answering of the other following questions. The outcome of this question revelled that ***level*** of study have significant influence on the definition of EduTech. 11% of the first year students were among the 12% who view EduTech as 'tools, machines and materials that help in teaching and learning. Conversely, ***program of study*** did not affect the definition of EduTech since students from different program of study indicated EduTech as 'the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources for teaching and learning'.

Question 9 (UG): Is there any educational technologies available at the university?

Interpretation - From the research finding, 99% of the students indicated the availability of EduTech at UG business school. Only 1% expressed their view that there is no EduTech at UG business school. The conclusion here is that there is EduTech at UG

business school to enhance teaching and learning. This is illustrated in figure 7.5a at appendix L.

Question 10 (UG): If yes from (9) what educational technologies are available at your university?

Interpretation - This question gave the 99% students who indicated the existence of technology the opportunity to state all the available EduTech at UG business school. The following are the list of EduTech given by UG students: UGBS Mobile learning, Sakai, Computers, Nikasemo, Balme library, Projectors, Internet, Student email, Laptops, Wi-Fi, Newspapers database, Speakers and microphones, SPSS.

Question 11 (UG): Are the available educational technologies in good condition?

Interpretation - All the 99% of students who listed the above EduTech expressed their satisfaction in the condition of service about the available EduTech, by indicating that those EduTech are in good condition for teaching and learning to effectively take place. Only 1% disagreed with the good condition of service about the available EduTech at UG. This is shown in figure 7.6a at appendix L.

Question 12 (UG): Do you use any kind of educational technologies in learning?

Interpretation - 96% of the respondents indicated that they use EduTech in their learning activities, whilst 4% stated they do not use any form of EduTech in learning. This shows the extent of technology usage in UG business school. This is shown in figure 7.7a at appendix L.

Question 13 (UG): If yes from (12) what educational technologies do you use in learning?

Interpretation - This helped students to highlights all the various EduTech employed in their learning activities. The following are the list of EduTech used by the 96% of the students: Projectors, Mobile phones, Laptop and computers, Wi-Fi, Microphones, Tablet IPad, Sakai, YouTube and emails, Microsoft office, Google scholar, Pen-drive, Calculator, Mathematical set, and Ruler

The list given by students at UG revealed the tangible (Projector, mobile phones, laptop and computer etc.) and intangible (Sakai, YouTube, Google scholar and Microsoft office) aspect of EduTech available to students, which could as well be referred to as the process and product aspect of EduTech. From the survey results, ***program of study*** affect the type of EduTech used by students. 31% and 11% of students studying accounting and banking and finance respectively, had uniformity in the types of EduTech used in learning; calculator, Ruler, mathematical set, Microsoft excel and YouTube. Students studying marketing and Health Sector management also stated Google scholar, Sakai, laptops, computers and Pen-drives. The remaining program of study listed in question 4 above stated other given EduTech above.

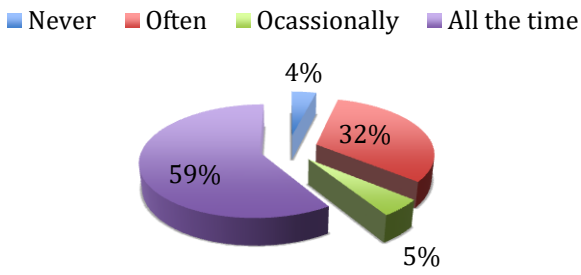
Question 14: If No from (12) why don't you use educational technologies?

Interpretation - Out of the 4% students who do not use any kind of EduTech in learning, 2 students indicated they lack the skill set to use any kind of EduTech in their learning processes, 1 student also stated EduTech makes learning difficult, hence do not employ any kind of EduTech in learning. The remaining students also indicated the absence of the required EduTech in learning as the reason for not using any kind of EduTech in learning.

Question 15 (UG): How frequent do you use technologies in your learning activities?

Interpretation - Having provided the list of EduTech used in learning, this question provided the researcher with the frequency at which these students at UG used EduTech in their learning activities. From figure below, majority (59%) of the students use EduTech 'all the times' in their learning activities, whilst 32% of the students also often use EduTech in their school learning programs. 5% also indicated they use EduTech just occasionally to learn. It emerged from the finding that, only 4% of the students do not use any kind of EduTech in their learning activities. This is shown in the figure 7.8a below.

Figure 7.8a: Frequency of usage

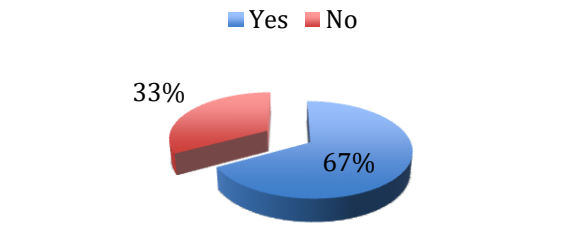


Source: Field survey, 2016

Question 16 (UG): Is there any effective university leadership for the implementation of educational technology in the classroom teaching and learning in your university?

Interpretation - From figure 7.9a below, 67% of the students indicated that UG has effective university leadership that sees to the implementation of EduTech into classroom curriculum, whilst 33% also disagree to the existence of effective university leadership. This means that majority is of the view that the current university leadership sees to the integration of ICT into classroom activities.

Figure 7.9a: Availability of Effective Leadership at UG



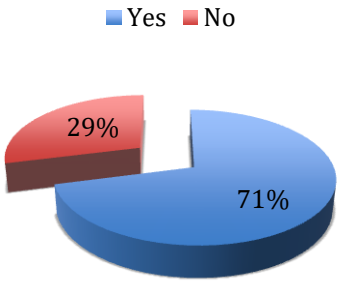
Source: Field survey, 2016

Question 17 (UG): Are there any training programs organized by the university to teach students on the use of educational technologies?

Interpretation - Training and development programs equip students with the necessary skills to use technologies and develop other individual talents. 71% of the students

indicated there are effective training programs organized by the university to help students with the use of EduTech. However, 29% of the students also disagree to the existence of any training programs at UG business school. Since there is significant difference (71% and 29%) between student's perceptions on the existence of training programs at UG, the researcher can conclude that there are training programs at UG to help students with the use EduTech. This is shown in figure 7.10a below.

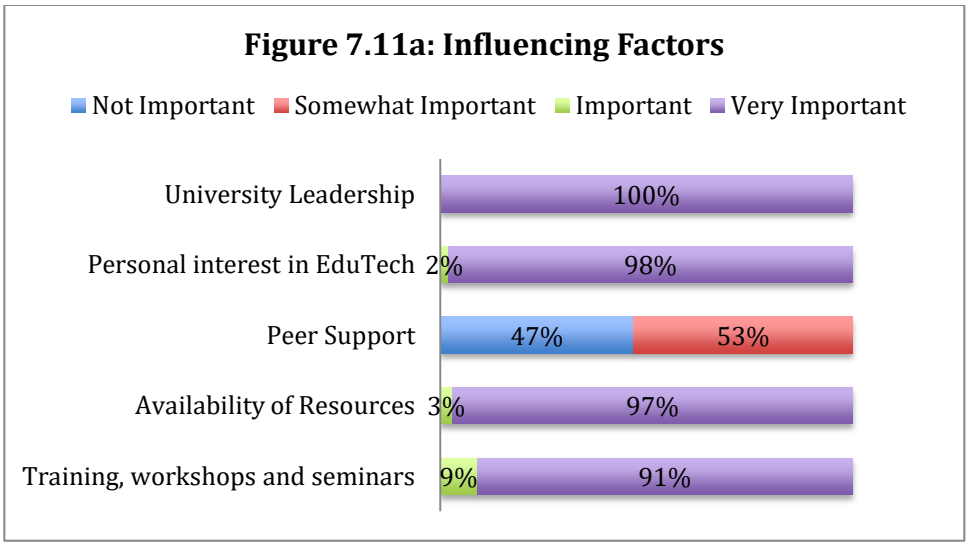
Figure 7.10a: Availability of Training programs



Source: Field survey, 2016

Question 18 (UG): How do you rate the importance of the following factors in influencing your use of EduTech?

Interpretation - From figure 7.11a below, all students (100%) indicated that university leadership is one of the most important factors, which influences the use of EduTech at UG. 98% of the students also believe that personal interest in EduTech is also very important for the realization of EduTech at UG. These personal interests explain the attitudes or behaviour towards the use of any technological tool for learning and teaching. 91% of the students also indicated that training; workshops and seminar programs are very important that influences students and teachers use of any form of EduTech in H.E.47% of the students however expressed that peer support is not an important factor that influences the use of EduTech in teaching and learning.



Source: Field survey, 2016

Question 19 (UG): What do you think are the benefits of using EduTech in learning?

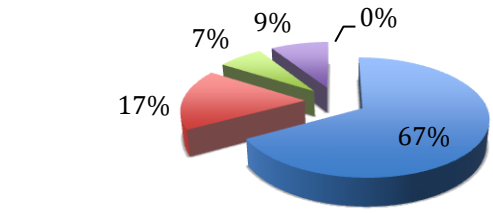
Interpretation - The outcome of the research investigation highlighted some benefits of using EduTech as indicated by students at UG. This is as follows:

- Makes teaching and learning easy
- Saves time
- Helps track students' academic progress and records
- Makes education accessible to all
- Makes collaboration more effective
- Enhances the quality of education
- Increases students understanding
- Creates future oriented students
- Improves skills
- Creates conducive learning environment
- Increases research potentials

Question 20 (UG): I have a strong attitude in using EduTech in learning

Interpretation - From figure 7.12a below, 67% of the students have a very strong attitude towards the use of EduTech in learning. 17% of the students also agree to have good attitude, which gives them a clear reason to use EduTech in their learning activities. 7% of the students were indifferent, thus neither agree nor disagree to have strong attitude in using any EduTech in their learning activities. However, a number of students (9%) also disagree to possess a good attitude for the use of any EduTech in their learning, this perhaps accounts for the 4% who do not use any EduTech in their learning processes as indicated in question 12 above.

Figure 7.12a: Attitude for the use of EduTech



Source: Field survey, 2016

Question 21 (UG): Are there are any consequences of using EduTech in learning?

Interpretation - Notwithstanding benefits derived from the use of EduTech, students also believe there are some potential consequences in using these technological tools in the classroom. 77% of the students (majority) disagree with any harm or consequences associated with the use of EduTech in learning, whilst 23% of the students were of the opinion that use of EduTech has some major consequences on student's academic achievement. This is shown 7.13a at appendix L.

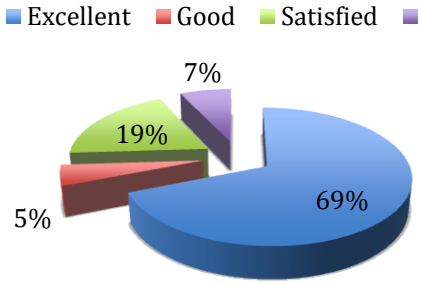
Question 22 (UG): Do your tutors employ any educational technologies in their teaching?

Interpretation - The outcome of the research study shows that 87% of the students agree to the use of various forms of EduTech by their respective tutors in teaching at UG business school. From the researcher's observation, most tutors at UG deploy projectors, microphones and speakers in teaching students. However, 13% of the students were of the view their tutors do not employ any EduTech in their teaching deliveries. This is shown in figure 7.14a at appendix L.

Question 23 (UG): How satisfied are you with your tutor's use of EduTech in teaching?

Interpretation - This question gave students the opportunity to express the satisfaction derived from their tutors of EduTech in teaching. In other words, how satisfied are they when their respective tutor's employ any form of EduTech in teaching. From the figure below, 69% of the students are feels their tutors use EduTech in an excellent manner in teaching, whilst 5% also indicated their tutors use are 'good' in the use of EduTech. Even though 7% rated their tutor's use of EduTech as 'Poor' performance, 19% of the students were also 'satisfied' with their tutor's use of EduTech in the classroom. This is shown in figure 7.15a below.

Figure 7.15a: Satisfaction in Tutor's use of EduTech

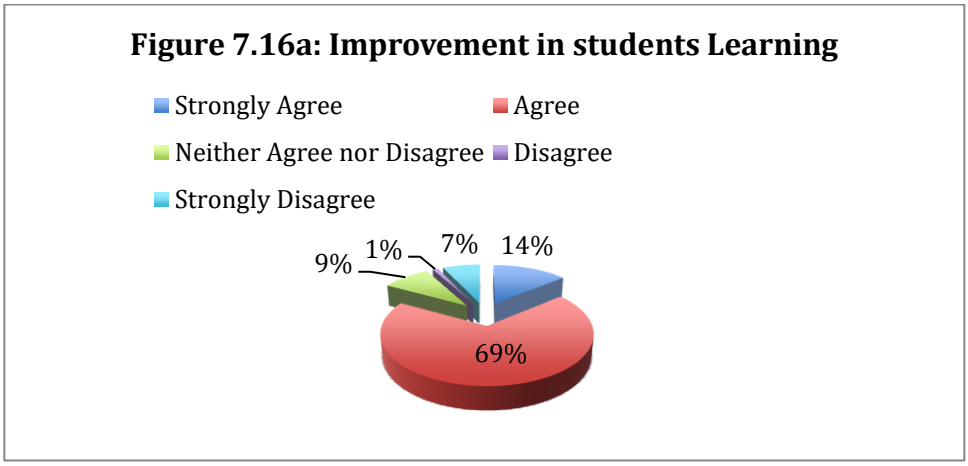


Source: Field survey, 2016

Question 24 (UG): Overall, the use of EduTech by your tutors improved your learning process

Interpretation - This question was intended to seek from students from UG how their learning processes have improved by the use of EduTech. From figure 7.16a below, majority (69%) of the students at UG 'agree' that their overall learning processes have been improved as a result of the EduTech. 14% of the students also 'strongly agree' that EduTech has improved their overall learning processes leading to higher academic achievement at UG. A total of 8% of the students, however disagree to the improvement of their learning processes by the use of EduTech in learning. Only 9% of the students were indifferent thus, neither agree nor disagree to the improvement of their learning processes by the use of EduTech.

Figure 7.16a: Improvement in students Learning



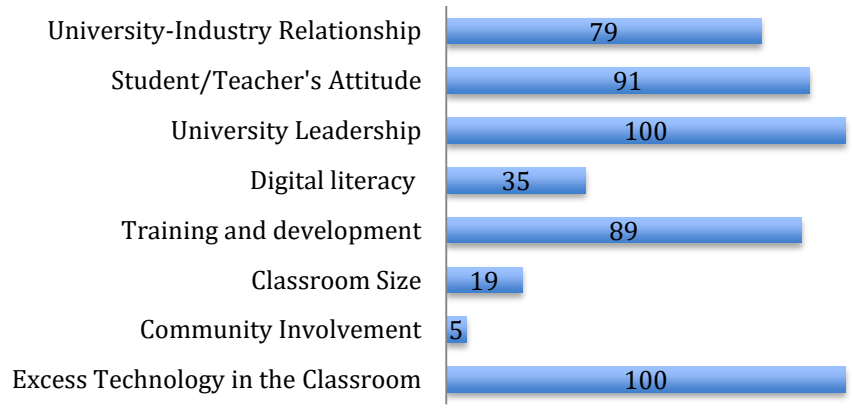
Source: Field survey, 2016

Question 25 (UG): Which of the following areas requires additional attention in education in the near future?

Interpretation - With the current form of Higher Education in Ghana, students at UG were given the opportunity to express their concerns with regards to areas which needs to be improved in the future of Ghana H.E. From figure 7.17a below, all students (100%) expressed that university leadership and excess technology in the classroom should be the main focus of educational authorities in the near future. According to students, these are areas that need serious improvement if the educational institution in Ghana needs to compete with the global world. 91% of the students also indicated that students and

teachers attitude to the use of EduTech must be improved in the future to allow for frequent use of these technological tools in teaching and learning. Training and development were also indicated by 89% of the students to be another important area for improvement in the future. A large number of students (79%) also indicated that university and industry relationship also needs to be improved to allow for a connection between what's been taught in schools and the demands of industries to empower the youth of industry needs.

Figure 7.17a: Areas of Consideration



Source: Field survey, 2016

7.6.4 Summary of findings for University of Ghana

The findings from the study reveals there was more males (57%) than females (43%) who took part in the research investigation. Majority (55%) of the students at the business school are within 18-25 years age group. BSc Business Administration recorded the highest students (48%) intake as the study reveals. 49% of the students are in their third year of study at the university. Students showed clear understanding of what constitutes technology- 44% of students view technology as both the product and process involve in the learning and teaching processes.

Having agreed (99% of students) to the good conditions of available technologies at the university, these students list the following educational technologies as present at UGBS: UGBS mobile learning, Sakai, Nikaseme, Balme library, Internet, students email, projectors, laptops, SPSS, speakers and microphones. The outcome of the study indicates

there is effective leadership (as indicated by 67% students) that provides training and development programs for students and teachers at the university.

Majority (67%) of the students indicated their frequent use of technologies is as a result of strong attitude towards the use of EduTech. Even though 87% of students at UGBS indicated their teachers use technologies in teaching, only 69% of students are satisfied and agree to the excellent manner of how these technologies are been applied. Majority of these students (77%) stated there are no major consequences in employing any kind of technology in education. Students therefore believe that the future of higher education in Ghana should see the improvement of leaderships that would provide excess technologies accompanied by effective training to eradicate the bad attitude towards accepting technologies in the classroom and beyond.

7.7 Findings for University of Cape Coast (UCC)

7.7.1 Introduction

The researcher administered 100 hard copies of questionnaires to students at UCC on 20th October 2016 in order to solicit for their respective ideas about EduTech. All 100 copies were received correctly filled by the selected business students between 10am – 4pm on same day. The following section would present the interpretations derived from the administered questionnaires that were received by the researcher.

7.7.2 Demographic Information

Question 1 (UCC): Gender of the Respondents

Interpretation - This question was intended to know how many males or female took part in the research and to what extent does gender significantly influences the use of EduTech in HE. Our research findings show that 60% of the respondents were males whiles 40% were females. In the nutshell, majority of the participants who participated at UCC were males. This is illustrated in figure 7.1b at appendix M.

Question 2 (UCC): Age distribution of respondents

Interpretation - It emerged from our finding that majority (57%) of the respondents were within the age group of 18-25 years. 43% of the students are within age 26-33 years old. No students were found within 34-41 and 42 years and above. This is a clear indication that most students at the business department at UCC are in their youthful stage. This is illustrated in figure 7.2b at appendix M.

Question 3 (UCC): University Attended

Interpretation - This question was intended to help the researcher distinguish among all four case universities used for this research. The result shows that all 100 respondents attend University of Cape Coast.

Question 4 (UCC): Program of Study at the UCC

Interpretation - The outcome of the investigation revealed only five particular program of study by the selected respondents. It emerged from the finding that 58% of the respondents studies Bachelor of Education (B.Ed.) in Accounting, 14% studies B.Ed. in Mathematics, 21%, 3% and 4% studies B.Ed. in Management, B.Ed. in Arts and B.Ed. in Social sciences respectively.

Question 5 (UCC): Level of study at UCC

Interpretation - The results of the investigation shows that 77% of the respondents are in their second year of study whiles 23% are level 300 students (third year). No records were noted for first and final year of study and other level of study, which could be postgraduate programs. The 'other' takes into consideration any postgraduate course of study at the university. Hence, only undergraduate students were involved in the study. This is shown in figure 7.3b at appendix M.

7.7.3 Educational Technology and Teaching & Learning

Question 6 (UCC): Definition of Technology

Interpretation - This question was intended to 'know' from students their perceived definition of the concept of technology, in order words the general meaning do students

give to technology. From the finding, 56% (40% first year students) of the students indicated that technology is 'the development and application of tools, machines, materials, and processes that help in solving human problems'. From the literature provided in the previous chapter (chapter 2), this definition was given by Reisman (2006, p.4) to take into consideration the product aspect (tangible asserts) of technology and the various processes (intangible), which helps in production of goods and services. 5% of the students indicated that technology is the process by which human modify nature to meets their needs and wants. This outcome clearly shows students have a clear idea of what technology is by 'ticking' an answer. It is very interesting to note that the ***level of study*** shows the maturity of students at the university; hence it has significant influence on the definition of technology. 39% (29% first year students) of the students also view technology as the 'information necessary to achieve a certain production outcome'.

Question 7 (UCC): Technology as a 'product' or 'process' or both

Interpretation - As a follow-up to clearly know the distinction students attached to technology, this question becomes inevitable. Even though majority (96%) indicated from the above question to show the meanings to technology that encompasses products and processes, all 38% of the students indicated that technology is a product rather than process. 22% of the students also view technology as a process. This is an indication that most students at the university have a clear meaning to technology. Majority of the students (40%) also believed that technology consist not only a product but also a process. This particular finding indicates that technology consist not only the product aspect such as tools and machineries, but also the procedures or processes in which these tools are used. This is shown in figure 7.4b below

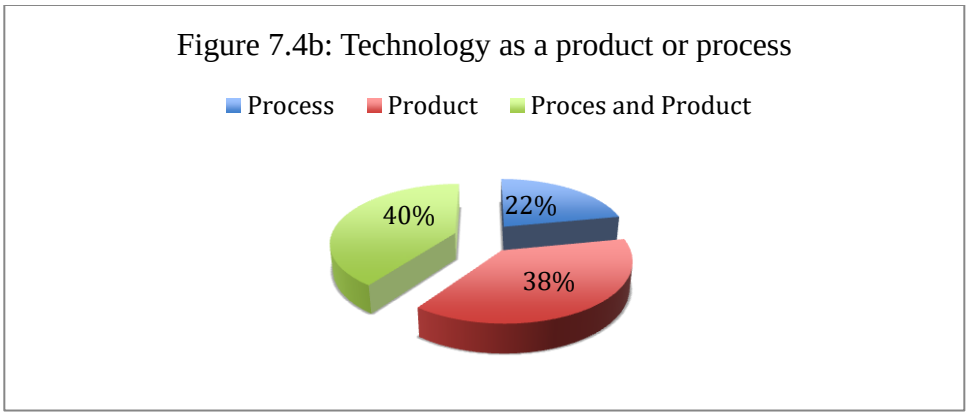


Figure 7.4b: Technology as a product or process

Source: Field survey, 2016

Question 8 (UCC): Definition of Educational Technology (EduTech)

Interpretation - Having given their perceived meaning to technology above, the researcher wanted to know how students view the concept of EduTech. In light of this, 46% indicated the EduTech is 'any physical approach by which educational instructions are presented to learners', 51% also view EduTech as the 'the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources for teaching and learning'. 3% did not provide any answer to this question. The conclusion is that majority of the students have a better understanding to what EduTech really mean. The definition indicated by the majority (51%) was given by AECT as their improved meaning to EduTech in 2008. This was a revised definition to the earlier definition, which existed in 1994, which also view EduTech as both 'product' and 'process'.

Question 9 (UCC): Is there any educational technologies available at the university?

Interpretation - From figure 7.5b below, 98% indicated that there are EduTech available at the UCC, whiles only 2% disagreed to the existence of EduTech at the university. The use of whiteboard and marker as well as microphones and speakers accounted for the large number of students who agreed to the existence of EduTech at UCC. Classes are mostly large and make it impossible to deliver teaching lessons without means of reaching the entire students. This is shown in figure 7.5b at appendix M

Question 10 (UCC): If yes from (9) what educational technologies are available at your university?

Interpretation - This was a follow-up question with regards to available EduTech at UCC. It was intended to give students the opportunity to state all available EduTech at the university. The following are available EduTech given by students from UCC: Projectors, Wi-Fi, Laptops, Public Address system, Microphones and speakers, White board and Markers, Computers, E-learning, Duster, Internet café and SPSS

Question 11 (UCC): Are the available educational technologies in good condition?

Interpretation - This question was intended to know whether the available EduTech at UCC are in good condition by way of functioning well. From figure below, 67% stated that the available EduTech at UC are not in good condition. This means there could be malfunctioning of those technologies employed in teaching and learning at UCC. However, 33% of the respondents were of the opinion that those available EduTech are in good condition, which facilitates teaching and learning at the university. This is show in figure 7.6b at appendix M.

Question 12 (UCC): Do you use any kind of educational technologies in learning?

Interpretation - The outcome of the research shows that 93% of students use EduTech in their private learning, whiles only 7% do not use any kind of EduTech in their learning activities. The results show that due to the advancement in ICT and movement towards digital generation, technological tools have become part of student's lives. The result is shown in figure 7.7b at appendix M. The *program of study* affected the outcome of this question since students who offers technology-requiring programs mostly employed the required EduTech in their learning. 43% out the 93%, offers accounting and all these students expressed their use of various forms of EduTech in their learning activities.

Question 13 (UCC): If yes from (12) what educational technologies do you use in learning?

Interpretation - This question was intended to give opportunity to students to list the kinds of EduTech in their learning activities. The following are some kinds of EduTech

stated by the 93% who uses EduTech in their learning activities: computer, projectors, GnuCash, Wi- Fi, Mobile phones, Microphone, Laptop, Highlighter, Ruler, Calculator, Mathematical set, YouTube, Excel, NolaPro

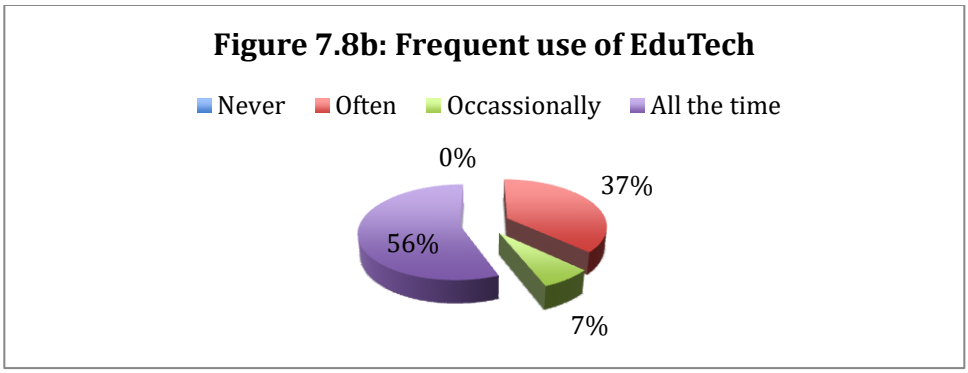
It is very important to note that ***program of study*** has significant influence on the type of EduTech used in learning by students. There was uniformity in the types of EduTech used by 40% of students offering B.Ed. in accounting and banking and finance at UCC for their personal learning, and these are NolaPro, calculator, YouTube, Excel, mathematical set, ruler and laptop. These are learning tools that help in the mathematical and other statistical calculations of the accounting and banking program of study. 10% of students offering mathematics also stated calculator, ruler, YouTube, Highlighter and computer as their main EduTech used in learning. Students offering management, arts and social sciences also stated the use of computer, projectors, mobile phones and Wi-Fi.

Question 14: If No from (12) why don't you use educational technologies?

Interpretation - It also important to note that, out of the 7% who do not use any kind of EduTech to learning (from question 12), 5% indicated that they 'lack the skill set' to use any kind of EduTech in learning, whiles the remaining 2% also indicated that the 'required EduTech' are not available to aid in their learning activities. No student expressed the opinion that EduTech makes learning difficult. Furthermore, no students also indicated that program of study does not require the use any form of EduTech.

Question 15 (UCC): How frequent do you use technologies in your learning activities?

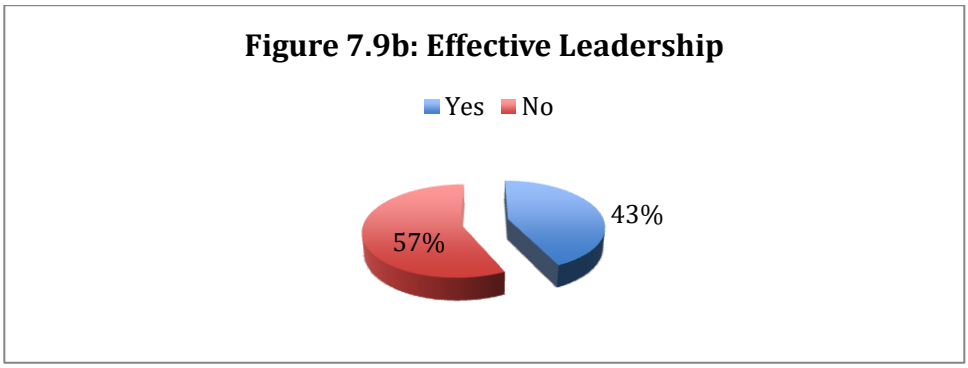
Interpretation - This question provided the opportunity for students to indicate how frequent they use these above listed EduTech in learning. From figure 7.8b below, majority 56% use EduTech 'All the times' in their learning activities, followed by 37% who also 'often' use EduTech to learn. Only 7% 'occasionally' use EduTech in learning. In conclusion, most students use different kinds of EduTech to learn on daily basis.



Source: Field survey, 2016

Question 16 (UCC): Is there any effective university leadership for the implementation of Educational technology in the classroom teaching and learning in your university?

Interpretation - From figure 7.9b below, majority (57%) of the students disagreed to the existence of effective leadership at UCC. 43% on the other hand indicated that there is effective leadership at UCC with regards to the implementation of EduTech in the classroom curriculum. This does not seem to suggest that UCC has no university leadership, but rather the implementation of EduTech is not a priority to the current leadership of the university.



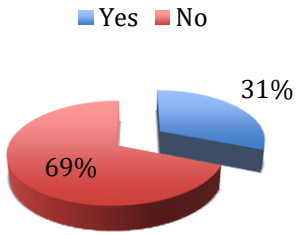
Source: Field survey, 2016

Question 17 (UCC): Are there any training programs organized by the university to teach students on the use of educational technologies?

Interpretation - The outcome of the research shows that 69% of the students indicated that there are no organized training and development programs on how to use or employ

EduTech in learning. This confirms the absence of effective leadership at UCC as indicated by students from question 16 above. 31% on the other hand agreed that the university organizes training programs to help students with the use of EduTech. From the literature, training and development program helps to strengthen the skill set of students and also bring them to a higher level of performance, which leads to dexterity (Collis & Hussey, 2014). This is shown in figure 7.10b below.

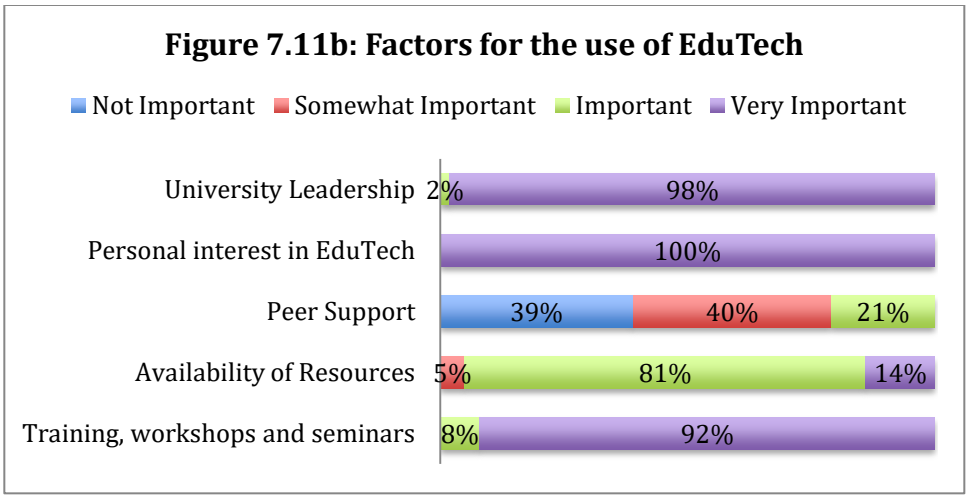
Figure 7.10b: Training Program



Source: Field survey, 2016

Question 18 (UCC): How do you rate the importance of the following factors in influencing your use of EduTech?

Interpretation - From the findings, all students indicated that personal interest in the use of EduTech is the most influencing factors to the use of technologies in the classroom. 98% of the students also indicated university leadership to be another important factor that promotes the use of EduTech in the classroom activities. Another influencing noted by the students (92%) is training and development program, followed by availability of technological resources. These illustrations are shown in figure 7.11b below.



Source: Field survey, 2016

Question 19 (UCC): What do you think are the benefits of using EduTech in learning?

Interpretation - This question provided students with the opportunity to state their perceived benefits of using EduTech to learn. The following are some benefits stated by students for using EduTech in their learning activities:

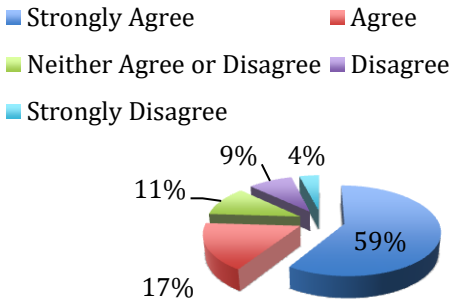
- Makes teaching and learning easy
- Facilitate research activities
- Equip students with the required skills needed for effective university education
- Helps students collaborate with teachers and peers outside classroom
- Creates conducive learning environment
- Instils in students the needed skills for employment
- Enhances academic success of students
- Prepares students for the future

Question 20 (UCC): I have a strong attitude in using EduTech in learning

Interpretation - From 7.12b figure below, 59% of students 'strongly agree' to have very good attitude in using EduTech in learning. This explains that majority feels comfortable in using EduTech in their day-to-day learning activities. This is followed by 17% who also 'agree' to have a strong attitude in using EduTech in learning. 11% were indifferent thus; neither agree nor disagree to having good attitude in using EduTech in learning. A

total of 11% indicated the absence of good or strong attitude to using EduTech in their learning activities. It is important to stress that one's personal attitude or interest is very vital to the use of any EduTech in learning.

Figure 7.12b: Attitude in Using EduTech



Source: Field survey, 2016

Question 21(UCC): Are there are any consequences of using EduTech in learning?

Interpretation - 57% of the respondents believe there are no possible consequences in using EduTech in learning. However, 43% of the students are of the view that the use of EduTech attracts several risks or harms to the 'user' (students). The existence of possible risks confirm the ideas of several other research (Oppenheimer, 1997; Wright, 2001; Jackson, 2004) who are of the view that over reliance on EduTech reduces students opportunity to socialize, and the risks of some students to physical problems such as repetitive stress injuries or eyestrain when using the computer. Other critics (Cooley, 2001; Blumenfeld *et al*., 2000) of the use of EduTech also express their concerns that when there is an increase in EduTech into the classroom, spending on other important programs such as music, arts and sports decreases. This is illustrated in figure 7.13b at appendix M.

Question 22(UCC): Do your tutors employ any educational technologies in their teaching?

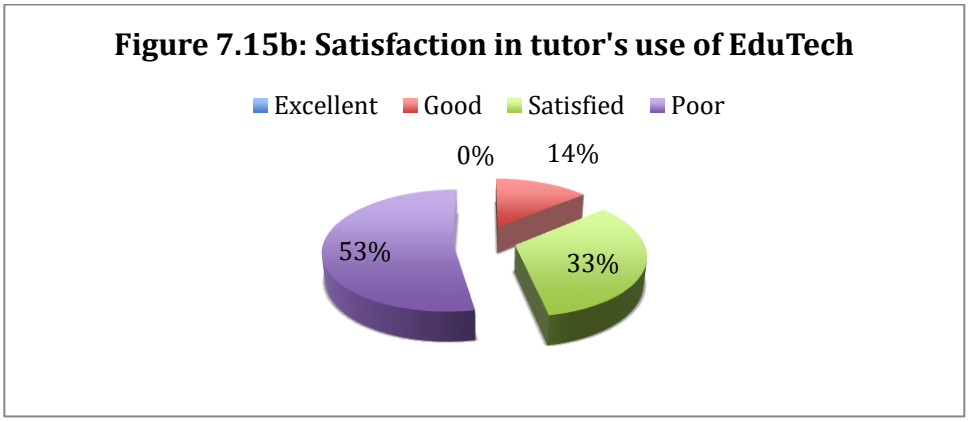
Interpretation - 96% of the respondents indicated that teachers at UCC use different forms of EduTech in teaching, whiles only 4% disagree to the use of EduTech by

teachers at UCC (As shown in figure 7.14b at appendix M). From observation, the most common EduTech used by teachers at UCC are projectors, markers, whiteboards, microphones and speakers to reach large audience.

Question 23 (UCC): How satisfied are you with your tutor's use of EduTech in teaching?

Interpretation - Question 22 above shows whether tutors at UCC use any EduTech in their teaching delivery, which a greater part of the students agreed. This question therefore shows whether students are satisfied with the use of these EduTech in teaching. From the figure below, 53% of the respondents indicated that tutors at UCC poorly use EduTech in teaching, followed by 14% who also indicated they are satisfied with use of EduTech by their teachers (As shown in figure 7.15b below). Only 33% indicated that teachers at UCC use EduTech in a good way in teaching which makes them satisfied. No one indicated how excellent teachers use EduTech at UCC.

Figure 7.15b: Satisfaction in tutor's use of EduTech



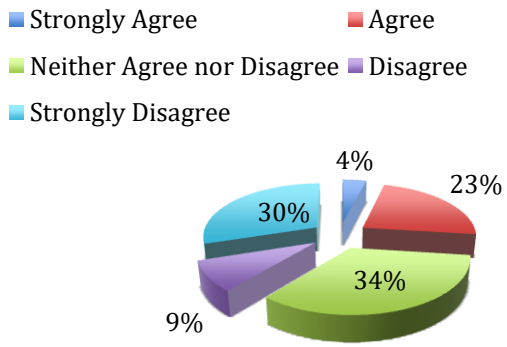
Source: Field survey, 2016

Question 24 (UCC): Overall, the use of EduTech by your tutors improved your learning process

Interpretation - From figure below, very few students (4%) strongly agree that their learning activities have been improved by their tutor's use of EduTech in teaching. 23% of students believed that their learning activities have increased as a result of their tutor's use of EduTech (As shown in figure 7.16b below). However, majority (34%) of the students were indifferent, meaning they neither agree nor disagree to the influence of

EduTech on their learning outcome. A total of 39% disagree to the fact that their tutor's use of EduTech has improved their learning activities.

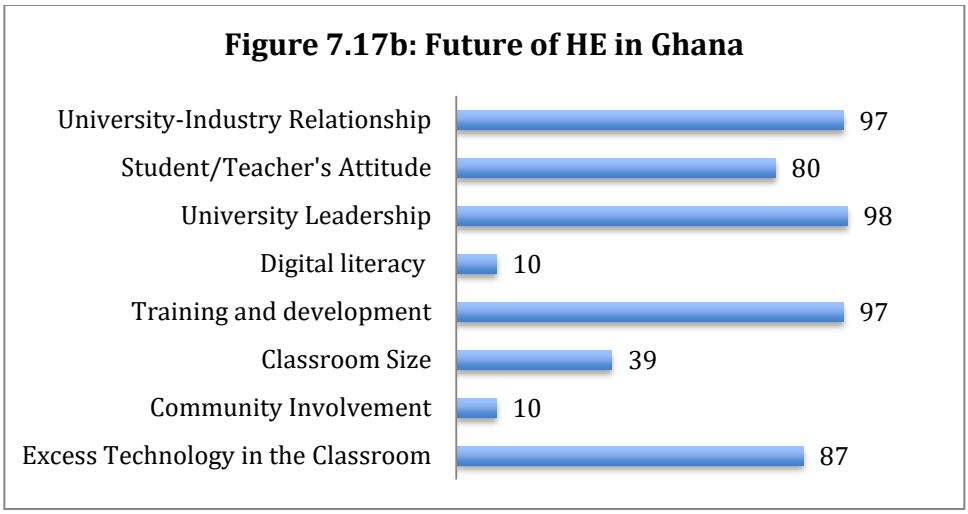
Figure 7.16b: Improvement in Student's Learning



Source: Field survey, 2016

Question 25 (UCC): Which of the following areas requires additional attention in education in the near future?

Interpretation - The findings above highlighted some major issues at UCC with regards to the use of EduTech in classroom activities by teachers and students. With the current situation at UCC, students were given this opportunity to indicate some major areas that needs to be improved at UCC in the future. Majority (98%) of the students stated that effective university leadership must be improved to see to the implementation of EduTech at UCC. 97% of students also indicated that university-industry relationship together with training and development programs ought to be considered. It also emerged from the findings that 87% of the students stated that, the university authorities must provide excess technologies into the classroom to allow students have access to those tools in their learning activities (As shown in figure 7.17b below). Students and teachers attitude towards EduTech was also highlighted my majority (80%) as area for further improvement. However, no many students saw the need to increase classroom size. This perhaps is due to the use of these EduTech, which could be used outside classroom. This is to say, students don't need to attend classroom before they can access course materials. This finding is illustrated in figure below.



Source: Field survey, 2016

7.7.4 Summary of findings for University of Cape Coast (UCC)

The findings from the study brought to fore some views on what constitute technology. Considerable number of students (40%) from UCC expressed their respective views by indicating that technologies consist of both the products and various processes that are adopted in the educational settings. Majority of students (98%) also indicated the availability of EduTech at UCC such as projectors, white boards & markers, PA systems, e-learning systems, computers, laptops and learning software such as SPSS. However, only 67% of the students agree to the good conditions of services for the available technologies at the university.

Significant number of students (57%) disagree to the existence of effective university leadership that see to the implementation of ICT projects as well as providing training programs for users. More than half of the students indicated there is no effective leadership at UCC that helps in the arrangement and implementation of ICT at UCC. This was also reflected by 69% of students who disagree to the availability of any training programs for teachers and students and other stakeholders. Large number (59%) of students from UCC have strong or good attitude in using any form of technology in learning and reported there are no major consequences in adopting technologies in academic activities.

Even though 96% of students agree to their instructor's use of technologies in teaching, 53% indicated that instructors at UCC poorly use technologies in their teaching deliveries. Hence, very few students (4%) strongly believed their learning activities have been impacted by the use of technologies at UCC. Students also gave their concerns with regards to areas in the higher educational sector that needs to be improved in the future. University leadership was the major area of concern students agrees needs improvement in the future. Majority of students indicated the relevance of industry and university relationship that ought to be improved to help the universities to tailor their curriculum to the demands of the industries. The technological demands of the industries would propel universities to enhance the digital literacy of its students. Students also proposes the need to provide more technologies in the classroom accompanied by training programs to instil into students the skill required for technology usage.

7.8: University of Professional Studies (UPS)

7.8.1 Introduction

The researcher administered 103 hard copies of questionnaires to students at UPS on 20th October 2016 in order to solicit for their respective ideas about EduTech. The researcher under this investigation administered 103 hard copies of questionnaires to students at the University for Professional Studies (UPS). However, only 97 correctly answered questionnaires were selected for the analysis in this section. The remaining 6 were discarded as a result of the respondent's inability to tick where appropriates the answers. Among these issues were for example, ticking two age groups and ticking Yes or No to same questions given. The following section would present the interpretations derived from the administered questionnaires that were received by the researcher.

7.8.2 Demographic Survey findings

Question 1 (UPS): Gender of the respondents

Interpretation - majority of the respondents from UPS were female consisting of 59 out of 97 students (61%). The remaining 39% (38 students) were males. It is therefore

evidently clear that more females participated than males in UPS for this research investigation. This is shown in figure 7.1c at appendix N.

Question 2 (UPS): Age Distribution at UG

Interpretation - 54% of the total respondents (75%) are within the ages of 18-25 years; whiles 25% students fall within 26-33 years. 16% of the students are within 34-41 years. Even though only 5% students are above 42 years, no student was above 51 years. This is a clear indication that majority of the students at the university are within their youthful ages. This is shown in figure 7.2c at appendix N.

Question 3 (UPS): University Attended

Interpretation - This was a significant question, which aided the researcher to distinguish between universities selected as case study for the research study. In terms of mix up, it aided the researcher to be able to locate which questionnaire falls under the universities used. All 97 students selected for the research study attended University of Professional Studies (UPS).

Question 4 (UPS): Program of Study

Interpretation - Majority of the respondents (59 students) are studying BSc Banking and Finance at University of Professional Studies. This represents 51% of the selected samples for the study. 18% students studies BSc Accounting, whiles 9% of the students studies BSc Marketing. 11% of the students studies Human Resource management. Only 11% student studies BSc Information Technology Management (ITM). In summary, the list of business programs that was revealed from the study is as follows: BSc Accounting, BSc Marketing, BSc Information Technology Management (ITM), Human Resource management and Banking and Finance.

Question 5 (UPS): Level of study at the university

Interpretation - Majority (69 students) of the respondents representing 71% are in the third year of study. This is followed by, 16 students (17%) who are in their final year of study (4^{th} year). 9% and 3% students are in their first and second year respectively at the

UPS. This is an indication that majority of students are in their third year edging close to their final year of study, followed by only 17% of students who are actually completing their course of study. This is shown in figure 7.3c at appendix N.

7.8.3 Educational Technology and Teaching & Learning

Question 6 (UPS): Definition of Technology

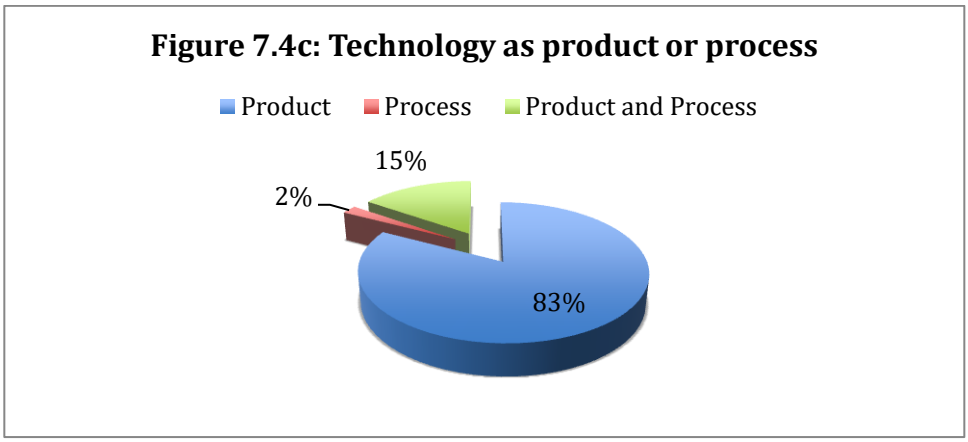
Interpretation - 78 out the 97 students (80%) selected for the study indicated their perceived meaning of technology by agreeing with the definition given by Reisman (2006) as 'the development of application of tools, machines, materials and processes that help in the solving human problems'. Furtherance to the definition, 12 students (13%) also gave various definition of technology by agreeing with the meaning given by Hawthorne (1971) and Galbraith (1972), which explains that 'technology is the application of scientific principles to solve practical problems'. Few students 6% also agreed that technology is 'the process by which humans modify their nature to meet their needs and wants'. Only 1 student indicated that technology 'is the information necessary to achieve a certain production outcome'. It therefore emerged from this question that majority of the students (80%) regard technology to mean the process of doing things as well as the product itself that aids that process. This meaning given to technology by the students concurs with the definition given by Lovell (1998) who indicated that 'technologies are separated into 'products technologies' (associated with the physical and engineering aspect of equipment) and 'process technologies' (associated with the process by which problems are solved'. Only a total of 19 students (20%) referred to technology as a 'process' from the definition given.

Question 7 (UPS): Technology as a 'Product' or 'Process'

Interpretation - One interesting thing that emerged from this question shows that, even though majority of the students (80%) as indicated in the above question agreed to the definition of technology to mean both a process of doing things as well as the product that aids the process, 81% of students agreed that technology is a 'product' rather than a 'process'. This means that majority of the students view technology as more of a particular 'physical assets' that aids in their daily activities. Only 17% of the students

indicated that technology consist of both process and product. However, 2% were of the opinion that technology is the only process aspect of doing things in our societies. Out of the 81% who indicated technology is a 'product', 40% are in third year of study; meaning their various forms of EduTech used in their learning activities informed their decision. This means that ***level of study*** has significant influence on the views or perceptions about what constitute technology. These illustrations are shown in figure 7.4c below.

Figure 7.4c: Technology as product or process



Source: Field survey, 2016

Question 8 (UPS): Definition of Educational Technology (EduTech)

Interpretation - With regards to the meaning students attach to EduTech, 75 % (73students) of the total respondents indicated that EduTech is the 'study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources for teaching and learning'. This is the definition given by AECT (2008), which described EduTech as being both a 'process' and a 'product'. This is an indication that majority of the students view those physical and educational processes of teaching and learning as EduTech. 21 students (22%) also agreed with the definition given by Reiser (2012) as 'any physical approach by which educational instructions are presented to school learners'. According to Reiser (2012), this was the early meaning given to technologies in the classroom before 1963, and this referred EduTech as merely 'instructional media'. 2% of the respondents also view EduTech as the 'theory and practice of design, development, utilization, management and evaluation of processes for learning'. Only 1% view EduTech as 'the application of tools, machines and materials that help in teaching and learning'. The

conclusion, drawn from this question means that most students have a clear-cut meaning to EduTech, which basically describes the tools employed by the tutors and the processes adopted to deliver their course contents to students.

Question 9 (UPS): Is there any educational technologies available at the university?

Interpretation - It emerged from the findings that 93 Students (96%) indicated that there are EduTech at UPS. However, 4% of the respondents also disagreed to saying that there are no such technologies available at UPS. This is shown in figure 7.5c at appendix N. It only seems natural the existence of whiteboard and marker accounted for most students indicating the availability of EduTech at UCC.

Question 10 (UPS): If yes from (9) what educational technologies are available at your university?

Interpretation - Majority of the students (96%) stated from the above question the existence of different kinds of EduTech at the UPS. This question therefore provided the opportunity for these students to state those technologies available, which consist of physical and intangible tools that aid the process of learning, and these are: Zipnet, E-learning module, Microphones and speakers, Whiteboards and markers, Projectors, Flipchart, Social media usage, Laptops and computers, Scanners and printers

Among these EduTech stated by these students, it emerged that projectors, speakers, microphones, Internet and e-learning module are the only EduTech that were stated by all 93 students who agreed to the existence of EduTech at UPS.

Question 11 (UPS): Are the available educational technologies in good condition?

Interpretation - 66 students (68%) indicated that those available EduTech are not in a good shape, whiles only 31 students (32%) expressed their satisfaction in the good condition of the technologies been used to teach by tutors at UPS. This means that majority of the students (68%) seeks improvement in the condition of those available EduTech at UPS. This is shown in figure 7.6c at appendix N.

Question 12 (UPS): Do you use any kind of educational technologies?

Interpretation - It emerged from the findings that all 97 students use several forms of EduTech for their learning activities. No student disagrees to the use of EduTech in learning.

Question 13 (UPS): If yes from (12) what educational technologies do you use in learning?

Interpretation – From the research outcome, various EduTech emerged as the main technological tools students at UPS use in their learning activities. There was however, uniformity in the types of EduTech stated by students offering a particular program at the university. This explains that ***program of study*** has significant influence on the type of EduTech employed by students in their learning activities. All students offering BSc Information technology management (11%) stated computer, iPad, YouTube and Twitter as the main EduTech been employed in their learning activities. 39% of the students offering BSc banking and Finance also stated calculator, ruler, laptop, YouTube and Microsoft word as their main EduTech used in learning. The other EduTech that were stated by all the students are highlighter, mobile phone, and mathematical set and Internet connectivity. In summary, the lists of EduTech stated by all the students are as follows: mobile phones, mathematical set, calculator, laptops, iPad, highlighter, computers, social media (e.g. twitter and YouTube) and Microsoft office suite.

Question 14 (UPS): If No from (12) why don't you use Educational Technologies?

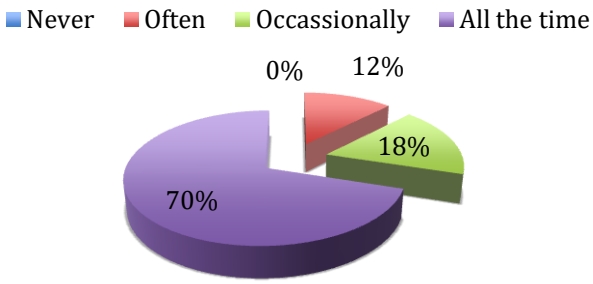
Interpretation – The outcome of question 12 above revealed that all students use various forms of technologies in their learning activities; hence no records were achieved for this question.

Question 15 (UPS): How frequent do you use technologies in your learning activities?

Interpretation - From figure below, majority (70%) of the students use EduTech 'All the time' in their learning activities, whiles 18% (17 students) indicated they use EduTech 'Occasionally' to learn. This means once in a while students use technologies in their daily activities. 12% also stated that they 'often' use EduTech. No one disagreed to the

use of any EduTech in learning activities. These finding shows how important students view EduTech in their operational lives. This is shown in figure 7.7c below.

Figure 7.7c: Frequency of use

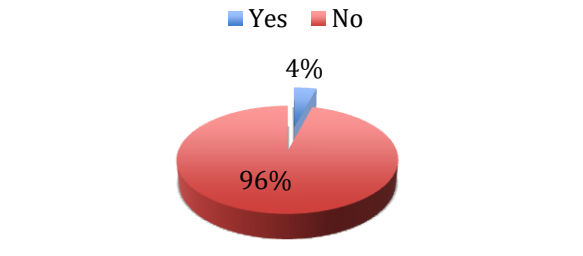


Source: Field survey, 2016

Question 16 (UPS): Is there any effective university leadership for the implementation of educational technology in the classroom teaching and learning in your university?

Interpretation - From figure 7.8c below, 96% of the respondents indicated that there is no effective leadership at UPS, which sees to the implementation of EduTech in the classroom curriculum. This means that there are no effective policies from the university's leadership, which addresses the concerns of students with regards to the usage of EduTech by students. Only 4% of the total respondents agreed to the existence of effective university leadership that oversees the implementation of EduTech into teaching deliveries by university tutors.

Figure 7.8c: Availability of Effective Leadership

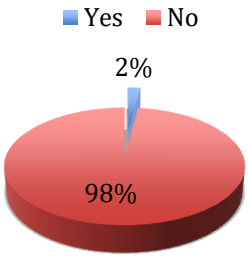


Source: Field survey, 2016

Question 17 (UPS): Are there any training programs organized by the university to teach students on the use of educational technologies?

Interpretation - From the findings, 98% of the students indicated there are no training and development programs organized by UPS to give effective skills to students on the use of EduTech. Only 2% agreed to the existence of training and development programs at the university. This finding confirms the absence of effective leadership at UPS. This is illustrated in figure 7.9c below.

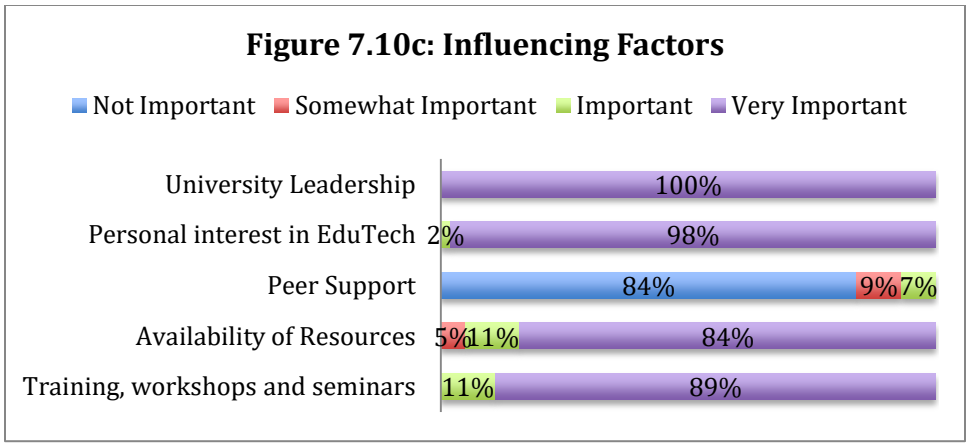
Figure 7.9c: Training programs



Source: Field survey, 206

Question 18 (UPS): How do you rate the importance of the following factors in influencing your use of EduTech?

Interpretation - Figure 7.10c below shows some influencing factors to the use of EduTech as indicated by the respondents. Among these factors, university leadership is the most important factor indicated by all the students (97 students). 98% of the students also indicated that personal interest in the use EduTech is very important factor to the use of such tools in learning. Only 2% agreed to personal interest as an important factor. Majority (84%) of the students also indicated that peer support is not an important factor in determining the use of EduTech, whiles 9% and 7% indicated that it is 'somewhat important' and 'important' factors respectively. 89 % and 84% of the respondents also indicated that training and workshops and availability of resources are two most important factors that influences the use of EduTech respectively.



Source: Field survey, 2016

Question 19 (UPS): What do you think are the benefits of using EduTech in learning?

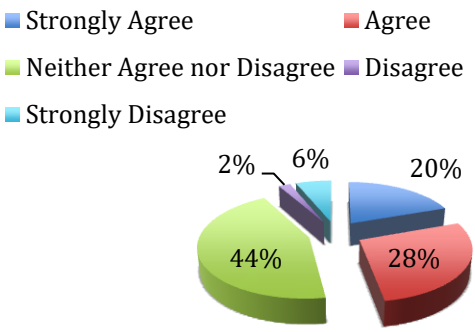
Interpretation - Opportunity was given to respondents to give their perceived benefits to the use of EduTech in learning. The respondents gave some of the benefits of using EduTech as the following:

- Makes learning easy
- Makes learning faster and efficient
- Easy accessibility and flexibility in acquiring information
- Makes teaching easy and faster
- Enhances digital literacies
- Broadens student's knowledge
- Saves time
- Improves technological skills needed at the workplace

Question 20 (UPS): I have a strong attitude in using EduTech in learning

Interpretation - With regards to student's attitude in using EduTech, 43 students (44%) were indifferent in attitude to using EduTech in their learning activities. A total of 46 students (47%) indicated that they have a strong attitude in using EduTech in learning. However, these attitudes were opposed by few sections of the students. A total of 8 students strongly disagreed to having good or strong desire to using EduTech in their learning activities. This is shown in figure 7.11c below.

Figure 7.11c: Student Attitude



Source: Field survey, 2016

Question 21 (UPS): Are there are any consequences of using EduTech in learning?

Interpretation - Notwithstanding the benefits given by respondents in question 19 above for the use of EduTech, possible consequences for the use of these tools were also indicated. During the pilot study, respondents were unable to write the exact risk associated with the use of EduTech, however agreed to possible consequences. This question was therefore meant to enquire from respective respondents whether there are possible consequences for using EduTech or not. 97% of the respondents indicated that there are consequences or harms in using EduTech in learning. Only 3% disagreed to that idea and believed there are no risks or harms in using EduTech in learning. This is shown in figure 7.12c at appendix N.

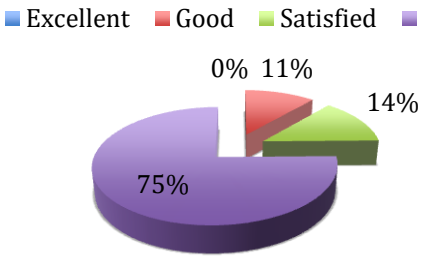
Question 22: Do your tutors employ any educational technologies in their teaching?

Interpretation - 98% of the students indicated that their respective tutors employ various forms of EduTech in their teaching deliveries, whiles 2% of the respondents disagreed with the majority of the respondents. Due to the large nature of classroom in most Ghanaian universities, tutors use microphones and speakers to reach out to large audience. This may have impacted on the response given by students on the use of EduTech by their respective instructors. This is shown in figure 7.13 at appendix N.

Question 23 (UPS): How satisfied are you with your tutor's use of EduTech in teaching?

Interpretation - This question was designed to seek from respondent's perspectives whether tutors employ satisfactorily EduTech in their teaching deliveries. This in respect covers areas of employing the right tool and the right time to teach students. The literature reveals that employing the right EduTech at the right time aids students learning which in turn increases their academic achievement. From figure 7.14c below, majority (75%) of the respondents rated their tutor's use of EduTech as 'poor'. This means that most tutors at the UPS do not effectively use EduTech in their teaching deliveries. 14% of the respondents were only satisfied with the use of EduTech by tutors, whereas only 11% have the view that tutors at UPS use EduTech in a good manner, which makes them, satisfied.

Figure 7.14c: Satisfaction Level



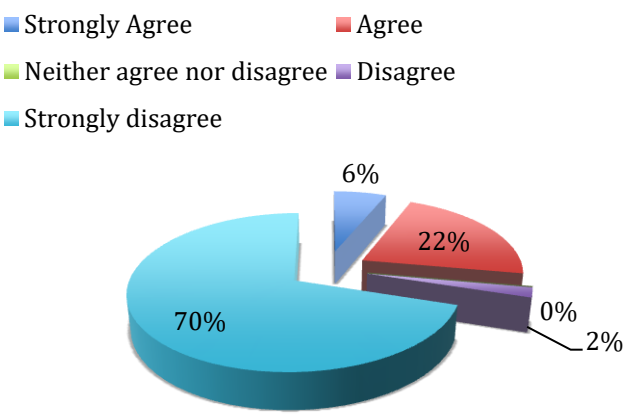
Source: Field survey, 2016

Question 24 (UPS): Overall, the use of EduTech by your tutors improved your learning process

Interpretation - This question was meant to enquire from respondents whether the use of EduTech by their respective tutors has in anyway improved their ways of learning. Figure 7.15c below, reveals that majority (68) of the respondents strongly disagree that their tutor's use of EduTech has improved their learning processes. 2 students also disagree that their learning processes have been improved due to the use of EduTech by their respective tutors. Only a total of 27 students indicated that their learning processes have been improved due to the use of EduTech by their tutors in their teaching activities at the

UPS. These findings concur with the above results (question 23) whereby majority of the students reported tutor's poor use EduTech, which makes students, not satisfied with teaching outcomes.

Figure 7.15c: Improvement in Learning



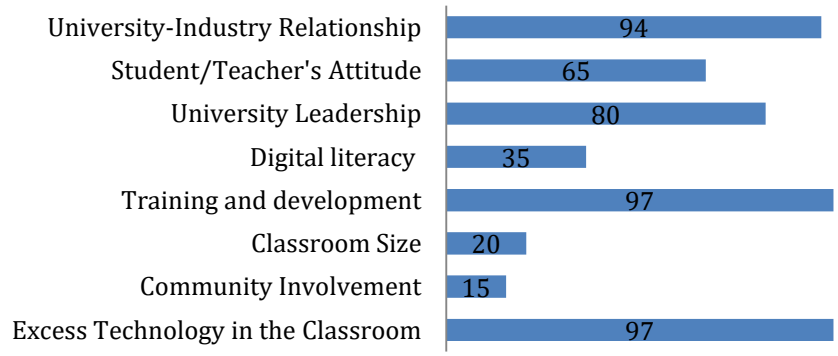
Source: Field survey, 2016

Question 25 (UPS): Which of the following areas requires additional attention in education in the near future?

Interpretation - The respondents indicated which areas in education needs additional attention to meet the needs of the 21st century system of education. Evidence, around the globe shows that, we are living in technological era, which is also referred to as 'digital world'. From figure below, all 97 students agreed that introduction of EduTech into classroom curriculum, and training and development are two most important factors that need more attention in the future. 94 (97%) students also indicated that there must be university-industry relationship in the future of higher education in Ghana. This collaboration between these two stakeholders to student's development will enable universities to tailor their courses offered at universities to fit the demands of the industries (As shown in figure 7.16c below). 80 (85%) students also indicated that university leadership is another factor that needs future considerations. Other areas of concern raised by the respondents are the students and tutor's attitude to the use of EduTech. Only few respondents, 15 and 20 students indicated that classroom size and

community involvement are another factors that needs future considerations. In the nutshell, most respondents do not believe that there must large classroom sizes in the future. It seems only natural to suggest that due to the advancement technology, all students must be present in the classroom before any meaning learning could be achieved. The emergence of Web 2.0 technologies has provided the platform for students and tutors to communicate irrespective of their geographical area.

Figure 7.16c: Areas of Consideration



Source: Field survey, 2016

7.8.4 Summary of findings for University of Professional Studies (UPS)

The research conducted at UPS recorded more females (61%) than males (39%). Students studying BSc Banking and Finance recorded the highest number (51%) of participants for this study, followed by BSc Accounting (18%). Majority of the participants (71%) from UPS are in their third year of study. All the students selected for the study from UPS also demonstrated their awareness of what constitute Educational Technologies by indicating the composition of both products and various processes that are engaged by instructors in teaching and learning. The research recorded similar technologies that are been available at other case study universities. These are Internet facilities, PA systems, projectors, e-learning module, flipcharts, white boards and marker and computers. However, 68% of the students indicated and expressed their concerns over the poor conditions of these technologies.

The findings also show that UPS has no effective leadership that sees to the implementation of ICT policies and the incorporation of these technologies into

classroom curriculum. The absence of strong leadership at UPS has resulted in inadequate training and development programs that are been provided to students and teachers to help with the skilfulness in managing technologies for academic activities. Students in their efforts to rate the importance of other factors that helps in the use of ICT in education indicated university leadership, user attitude, training programs and availability of technology to be the most relevant factors that needs to be taken into consideration.

Notwithstanding the benefits derived from the use of technology such as; easy access to information, saving time and enhancing digital literacy, 97% of students believe there are possible risk associated with the frequent use of technologies in education. Even though 98% of students agree to the use of technologies by their respective teachers, 75% indicated that teachers at UPS poorly use these technologies in their teaching deliveries. A total of 68 students pointed out that inappropriate and poor use of technologies by their teachers has provided no impact on their learning activities and therefore put forward some important factors that need to be taken into consideration to improve the future of Higher Education in Ghana. The main factors students believe ought to be improved in the future to enable effective adoption of ICT in education are; university-industry relationship, training and development programs and university leadership role in providing sufficient technologies in the classroom.

7.9 Findings for Kwame Nkrumah University of Science and Technology (KNUST)

7.9.1 Introduction

The researcher travelled 254.61 km by car from Accra to Kumasi where KNUST is located on 25th October 2016 to conduct interviews and administer questionnaires to students at the business school. The questionnaires were given to 105 students between the hours of 10am - 4pm on same day. All questionnaires were collected, packed and

sealed into an enveloped. 100 correctly filled questionnaires were selected and used for this study.

7.9.2 Demographic Information

Question 1 (KNUST): Gender of the respondents

Interpretation - As shown in figure 7.1d at appendix O, majority of the respondents from KNUST were male consisting of 89% students. The remaining 11% were females. It is evidently clear that more males participated in this study than females at KNUST.

Question 2 (KNUST): Age distribution of the respondents

Interpretation – As illustrated from figure 7.2d at appendix O, majority of the students are within the ages of 18-25 years; 39% are within the ages of 26-33 years, whiles only 4% of the students are within 34-41 years. No students were found to be within the ages of 42 years and above. This shows that most students at the business school are very young.

Question 3 (KNUST): Which University do you attend?

Interpretation - This was a significant question, which aided the researcher to distinguish between universities selected as case study for the research study. In terms of mix up, it aided the researcher to be able to locate which questionnaire falls under the universities used. All 100 students selected for the research study are from KNUST business school.

Question 4 (KNUST): Program of study

Interpretation - Majority of the respondents (67%) are studying BSc Banking and Finance. 13% of students studies BSc Accounting, whiles 4% of the students studies BSc Marketing management. 7% of the students also studies BSc Human Resource Management, 5% of the students also studies Procurement management whilst 4% of offers International business management. In summary, the list of business programs that was revealed from the study is as follows: Accounting, Marketing management, Human Resource management, Procurement management and International business management

Question 5 (KNUST): Level of study

Interpretation - From the study, 64% of the students are in their first year of study, whilst 21% of the students are in their second year of study. 7% and 8% of the students are in their third and final year of study respectively. No student was studying for a postgraduate program. This is shown in figure7.3d at appendix O.

7.9.3 Educational Technology and Teaching & Learning

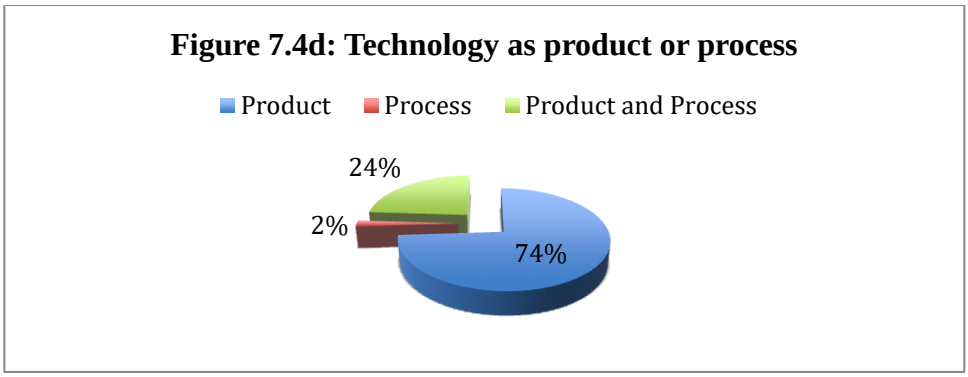
Question 6 (KNUST): Definition of 'Technology'

Interpretation - From the research investigation, 89% of the students gave their perceived meaning of technology as 'the development and application of tools, machines, materials and processes that help in the solving of human problems'. The remaining 11% also expressed that technology 'is the information necessary to achieve a certain production outcome'. No students indicated that technology is the process by which human modify nature to meet needs and wants. No records were also found on students to state that technology is the application of scientific principles to solve practical problems. The outcome of the research shows that majority of the students view technology as those physical assets that aids production processes.

Question 7 (KNUST): Technology as a 'Product' or 'Process'

Interpretation - From this study, majority (74%) of the students indicated that technology is a 'product', whilst only 2% of the students expressed that technology is a 'process' (as shown figure 7.4d below). However, 24% of the students are of the view that technology constitutes both the product and process aspect as the same time. This means that majority of the students view technology as tangible and physical tools for production processes. It is very interesting to 40% of the accounting students were part of the 67% students who indicated that technology is a product. Perhaps, this is due to particular software or tools employed in teaching and learning deliveries. This means that the ***program of study*** has a significant influence on what constitute technology.

Figure 7.4d: Technology as product or process



Source: Field survey, 2016

Question 8 (KNUST): Definition of 'Educational Technology' (EduTech)

Interpretation - With regards to the meaning students attach to EduTech, 17% of the students indicated that EduTech is the 'study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources for teaching and learning'. This is the definition given by AECT (2008), which described EduTech as being both a 'process' and a 'product'. However, majority (76%) of the students also indicated that EduTech are 'the tools, machines, and materials that helps in teaching and learning. 7% of the students also defined EduTech as 'any physical approach by which educational instructions are presented to school learners'. In conclusion, most students view EduTech as those tools rather than process, in the teaching and learning activities.

Question 9 (KNUST): Is there any educational technologies available at the university?

Interpretation - The findings from this research show, 93% of the students agreed to the availability of various forms of EduTech at KNUST, whilst 7% of the students indicated that there are no EduTech at KNUST for teaching and learning. This is shown in figure 7.5d at appendix O.

Question 10 (KNUST): If yes from (9) what educational technologies are available at your university?

Interpretation - The following are various forms of EduTech available at KNUST business school as indicated by the students: Projectors, Flipchart, Whiteboard and markers, Wi-Fi, Microphones and speakers, E-learning module

The kinds of EduTech listed above shows the level of technology advancement in Ghana as argued by several researchers in technology. Researcher (Blackman & Segal, 1992; Neave & Vught, 1994; WGDOL, 2003) believes the level of technology in a particular country or location has a significant influence on the kinds of technologies that would be available to universities around or in that country or location.

Question 11 (KNUST): Are the available educational technologies in good condition?

Interpretation - 63% of the students indicated that all the above listed EduTech at KNUST are not in good condition, whilst only few (37%) agree to the good condition of the available EduTech for teaching and learning. This is shown in figure 7.6d at appendix O.

Question 12 (KNUST): Do you use any kind of educational technologies in learning?

Interpretation - Majority of the students (89%) indicated they use various forms EduTech in learning, whilst few students (11%) disagreed to the use of any EduTech in their learning processes. This is shown in figure 7.7d at appendix O.

Question 13: If yes from (12) what educational technologies do you use in learning?

This question provided the opportunity to list all the kinds of EduTech they used in learning at the university. The following are all kinds of EduTech that emerged from the survey: Calculator, YouTube, Felt-pen, Emails, Laptops, Computer, Microsoft office, Wi-Fi, Skype, and Rule.

Among the above listed EduTech, calculator and ruler are the only EduTech, which was indicated by all accounting and banking, and finance students. This means that the

program of study significantly affect the choice of EduTech used in student's learning activities.

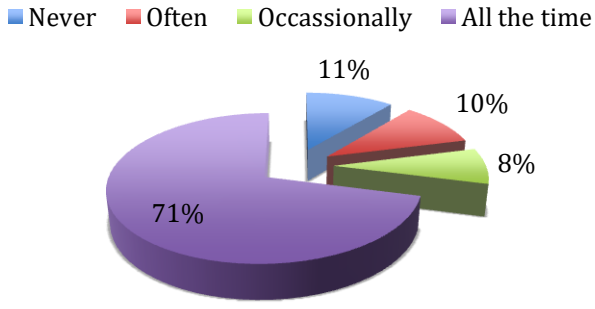
Question 14 (KNUST): If No from (12) why don't you use educational technologies?

Interpretation - This question helped the researcher to unravel the actual reasons why some part of the students do not use any form of EduTech in learning activities. Out of the 11% who disagree to the use of any EduTech in learning, 6% indicated that they lack the skill set to use any form of EduTech in their learning activities. The remaining 5% students also expressed that they do not need any kind of EduTech in their learning processes, hence their failure to adopt any EduTech in learning.

Question 15 (KNUST): How frequent do you use technologies in your learning activities?

Interpretation - From question 12 above, 89% of students stated they used various forms of EduTech in learning, hence this question helped the researcher to 'know' how frequent students uses EduTech in their learning processes. 71% of the students use EduTech 'all the time' whilst 8% also use EduTech 'occasionally'. 10% of the students also indicated they use EduTech 'often' to learn. 11% of the students also indicated they don't use any form of EduTech in learning. This is shown in figure 7.8d below.

Figure 7.8d: Frequent use EduTech

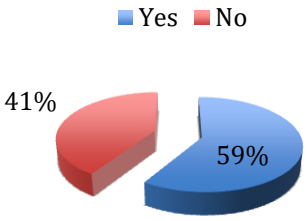


Source: Field survey, 2016

Question 16 (KNUST): Is there any effective university leadership for the implementation of educational technology in the classroom teaching and learning in your university?

Interpretation - From figure 7.9d below, 59% of the students agree that there is effective university leadership that at KNUST that sees to the implementation of EduTech in the classroom for teaching and learning. 41% of the students also indicated that there is no effective university leadership at KNUST that helps for the implementation of EduTech in the classroom.

Figure 7.9d: Efective university leadership

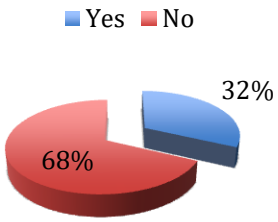


Source: Field survey, 2016

Question 17 (KNUST): Are there any training programs organized by the university to teach students on the use of educational technologies?

Interpretation - It emerged from the findings that 68% of the students indicated there are no training programs organized by the KNUST to help students with the use of EduTech in learning processes. On the other hand, majority of the students 32% of the students also disagree by stating that the university provides training programs that aids students with the skill set in using any kind of EduTech in learning. This is shown in figure 7.10d below.

Figure 7.10d: Training programs

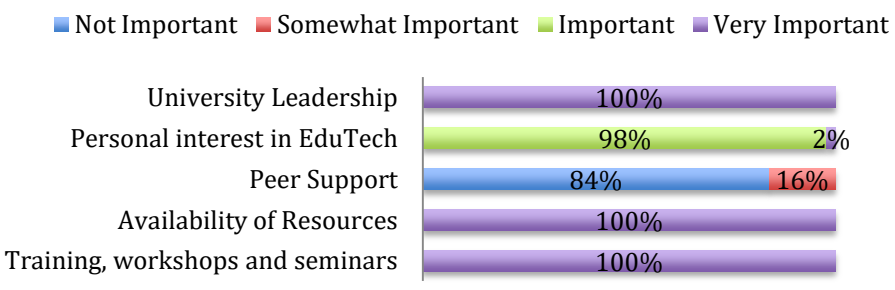


Source: Field survey, 2016

Question 18 (KNUST): How do you rate the importance of the following factors in influencing your use of EduTech?

Interpretation - This question helped the researcher to explore some influencing factors for the use of EduTech by students (As shown in figure 7.11d below). Given some factors gathered from the literature review, students ranked which ones are very important for the realization of EduTech in the classroom. From the figure below, all students (100%) indicated that university leadership, availability of technological resources and training programs are the most important factors that which aids the effectively aids the integration of EduTech in the classroom. Majority of students (98%) also indicated that personal interest in the use of EduTech is 'important' for the realization of effective EduTech in the classroom. In other words student's attitude is a contributing factor in using EduTech for learning activities. Notably, 84% of the students also indicated that peer support is not an important factor that influences student's attitude to use any form of EduTech to learn.

Figure 7.11d: Influencing factors



Source: Field survey, 2016

Question 19 (KNUST): What do you think are the benefits of using EduTech in learning?

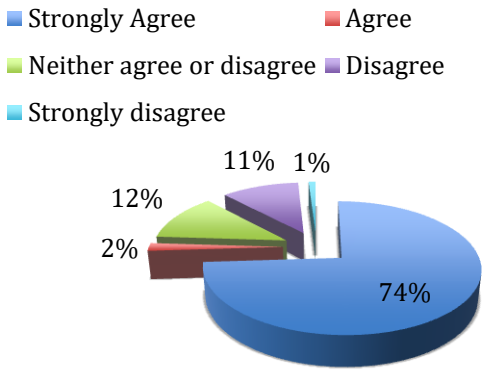
Interpretation - This question provided students the opportunity to state all perceived benefits of EduTech for learning. The following are some benefits of using EduTech that emerged from the finding:

- Makes learning easier and efficient
- Promotes independent student learning
- Enable easy accessibility to educational or learning materials
- Makes research easier
- Broadens student's knowledge which enhances global learning
- Enhances the digital literacies of students for the future
- Enable better simulations and models
- Allows for effective student assessment
- Provides interactive and students centred activities
- Provides electronic learning resources to students and teachers
- Helps in collaborative learning

Question 20 (KNUST): I have a strong attitude in using EduTech in learning

Interpretation - This question was intended to explore the attitude of students in using EduTech in learning at KNUST. It emerged from our finding that 74% of the students have 'strongly agree' to have a good attitude in using EduTech in learning. 2% of the students also 'agree' by indicating they have strong attitude in using different forms of EduTech in learning. A total of 12% of students disagree to have good attitude in using EduTech in learning. Only 12% of the students 'neither agree nor disagree' to have good attitude in using any form of EduTech in learning. This is illustrated in figure 7.12d below.

Figure 7.12d: Student Attitude in using EduTech



Source: Field survey 2016

Question 21 (KNUST): Are there are any consequences of using EduTech in learning?

Interpretation - Findings from this question revealed that 78% of the student indicated there are various consequences in using EduTech in learning, whereas 22% of the students also disagree to any consequences associated with the use of EduTech. This is shown in figure 7.13d at appendix O.

Question 22 (KNUST): Do your tutors employ any educational technologies in their teaching?

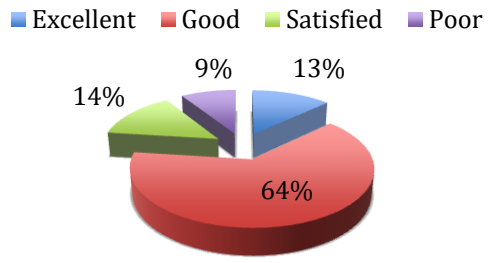
Interpretation - Majority (97%) of the students agree to that fact tutors at KNUST employ various forms of EduTech in their teaching deliveries. However, 3% of the students indicated that no forms of EduTech are been used by their tutors in teaching. This is shown in figure 7.14d at appendix O.

Question 23 (KNUST): How satisfied are you with your tutor's use of EduTech in teaching?

Interpretation - From figure 7.15d below, 64% of the students are satisfied and ranked their teachers' use of EduTech as 'good'. Only few (13%) indicated that their teachers use EduTech in 'excellent' manner. Even though 14% are satisfied with their tutor's use

of EduTech, 9% also indicated that their respective tutors use EduTech in an undesirable (poor) way.

Figure 7.15d: Satisfaction of level

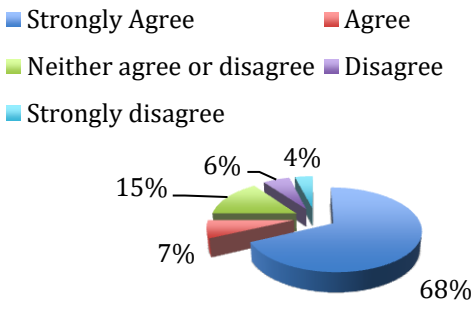


Source: Field survey, 2016

Question 24 (KNUST): Overall, the use of EduTech by your tutors improved your learning process

Interpretation - This question was intended to inquire from students whether the use of EduTech has improved their overall learning processes. From figure 7.16d below, majority (68%) of the students indicated they 'strongly agree' that the use EduTech by their teachers have overall their learning processes. 7% of the students also 'agree' that they use of EduTech has improved their learning processes. However, a total of 10% also disagree to that fact that EduTech has improved their learning processes. 15% of the students were 'neither agree nor disagree' with the improvement of their learning processes as a result of the use of any EduTech.

Figure 7.16d: Improvement in students learning

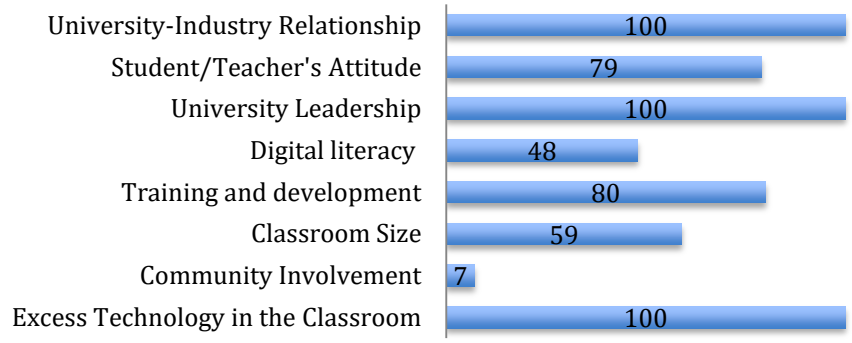


Source: Field survey, 2016

Question 25 (KNUST): Which of the following areas requires additional attention in education in the near future?

Interpretation - From the research findings, students highlighted some areas that need major improvement at KNUST. Areas such as university-industry relationship, university leadership and excess EduTech in the classroom were seen as the most important factor that needs consideration. Majority of students, (80) also indicated that training and development of students need to be considered in the future, followed by 79 students who also expressed the need to students and teachers to change their attitude with regards to how to use various forms of EduTech in the future. 59 students also indicated that classroom sizes are small, hence authorities at HE should consider future redevelopment of classroom sizes. This is shown in figure 7.17d below.

Figure 7.17d: Future areas of consideration



Source: Field survey, 2016

7.9.4 Summary of findings for KNUST

The research conducted at KNUST recorded more males (89%) than females (11%). More than half of the entire participants (57%) are within 18-25 years. There were more students (67%) studying BSc Banking and Finance, followed by BSc accounting (13%). Out of a total of 100 students who participated in the study, 64% are in their first year of study, hence the findings from for this study has significantly been impacted upon by the experience of the students with regards to the use of technology in learning and teaching. Due to the experience of the students, 74% view technology as a product whiles only few students (2%) indicated that technology consist of processes that aids production. In view

of this understanding of what constitutes technology, majority of students (76%) expressed those educational technologies are the tools, machines and other materials that help in the educational activities.

Majority of students agree to the existence of effective leadership that helps in various ICT projects at KNUST, and this was reflected by 93% of students indicating the availability of various forms of technologies provided by the university to its teachers and students. However, 63% of the students recorded that most of the technologies that are available are not in good condition and this affects users to undertake any meaningful educational projects. Similar to UPS, students at KNUST also stated various forms of technologies that are available such as projectors, flipcharts, PA systems, internet facility and whiteboards and markers. Majority of students (89%) agree to use various forms of technologies in learning, whiles only few stated that lack of skill set to manage these technologies hinders their ability to employ any technology to learn.

The study also show there are no proper training and development programs that are been organized by the university authorities to equip students with the technical knowhow on how to manage educational technologies. Students from KNUST indicated that university leadership that fully provides for technologies as well as training programs, in addition to personal attitude in managing technologies are very important factors that aids in the ICT implementation projects in Higher Education. Even though large number of students (74%) agree to the existence of associated risks in using technologies in education, they believe technologies provides the educational environment with the needed flexibility to engage in effective learning process. In addition, the findings show that technology into education helps in collaborative learning, enhances digital literacy, allows for effective students assessment and makes research easier and faster. Students therefore believe the future of Higher Education in Ghana should see an improvement in university-industry relationship, excess technology, training programs and effective leadership, which could help, eliminate poor attitude to technology usage in education.

Chapter 8.0: Interview Investigation

8.1 Interview findings for KNUST

8.1.1 Introduction

As shown in Table 8.1 below, analysis for the interview began with the coding and demographic information analysis of the interviewee before moving on to presents the actual questions for the study, which answers the research questions.

Table 8.1: Coding and Demographic Information of interviewee from KNUST

Coding	Gender	Age	Program of Teaching	Qualification	Teaching Experience
Lecturer 1	Male	41-50	Finance	MPhil	3 Years
Lecturer 2	Female	41-50	Marketing	MPhil	3 Years
Lecturer 3	Male	51 and more	Business and management	PhD	5 Years
Lecturer 4	Male	41-50	Business Ethics and CSR	PhD	6 Years
Lecturer 5	Male	31-40	Accounting	PhD	5 Years

8.1.2 Interview Analysis

Question 1 (KNUST): what is the difference between Education and learning?

Interpretation and Analysis – This question provided the opportunity for lectures from KNUST to give their respective views on the concept of education and learning. Out of the five Interviewees, there were uniformity among three, with regards to the difference between education and learning. Lecturer 1, 3, & 5 explained that education is more or less the actual processes that school authorities employ in giving directives to students to acquire knowledge. Furtherance to that, it involves the overall techniques of imparting

skills, knowledge and attitude in students. Whiles learning on the other hand, is the specific knowledge that has been gained through the process of education. This means that giving specific instructions through the act of education leads to the learning - the acquisition of the said knowledge or behaviour.

> *'…Education is about giving specific instructions to acquire knowledge whiles learning in this case would be the other end, that is what the students is supposed to have acquired, the change in attitude, change in maybe character, change in maybe how the person perceives how the other person looks at the world, alright. That would constitute maybe learning'……Lecturer 2*

This finding is in agreement with the assertion made by the Manpower Service Commission (1981, p. 17) which states that *' education are the activities which aim at developing the knowledge, skills, moral values and understanding required in all aspect of life rather than knowledge and skill relating to only limited field of activity'*

In contrast to the above, lecturer 4 has a conflicting view on the two concepts. He explained that education and learning could be given different meaning depending on the angle the individual perceives the terms by stating '*…education could be looked at as a process or as an output or an end product. If you say you are acquiring education for example, much of it is in the process but when you say you are educated, it's different.*

Lecturer 2 also indicated that learning is rather the various processes involved in helping students acquire specific knowledge in schools; whiles education is the knowledge that has been acquired. This means that, education is the subset of learning.

> *'…Yes, so we can say that learning leads to education except you want to use education to mean the process of learning then you cannot see the difference between education and learning'……Lecturer 2*

This analysis above concur with the assertion made by Selwyn (2010) who indicated that there are much debates and arguments concerning the actual meaning of the two terms which leads to most researchers using the terms interchangeably. The above analysis depicts that learning activities is not mostly linked to only educational institutions; rather

the individual could acquire knowledge from experiences and interaction with the environment. However, one common understanding derived is that, both education and learning helps the individual to acquire the skills and character needed to influence and change the society. The outcome of the investigation shows that lecturers at the university view education beyond the narrow definition to a larger extent. This concurs with Lodge (2000, p. 23) who stated that 'whatever *broadens our horizon, deepens our insight, refines our reactions, and stimulates our thoughts and feelings educates us'*. The findings also show that education is widely viewed as a process rather than a product.

Question 2 (KNUST): How can you define the concept of 'technology'?

Interpretation and Analysis – This question aided the researcher to know the various meanings lecturers attach to the concept of 'technology'. Out of the five lecturers, four of them are in agreement to the meaning of technology. Lecturer 2, 3, 4 & 5 indicated that technology comprises of the actual tools or anything that enhances operational activities. By this, they mean technology is a product or any physical assets that aids production processes. This is indicated below:

> *'…Technology is anything or tool that enhances certain process or a certain activity'……Lecturer 2*
>
> *'…Technology is anything that aids an activity'……Lecturer 3*
>
> *'.. They [technology] help us to work very fast and effectively'……Lecturer 4*

This finding *partly* concurs with the works of Mackenzi and Wajcman (1985, p. 23) who indicated that '*technology can be seen in three ways: the physical objects themselves; the human activities that takes place in conjunction with these physical objects; and as the human knowledge that surrounds these activities*'.

However, Lecturer 1 also gave an opposing view on the concept of technology. He explained that technology is rather the various processes that help in the production of goods and services. He stated:

‘ …… Technology is any process that enables an activity to go faster, more efficient and sometimes more cost saving than using the manual method’……..Lecturer 1

This particular finding is in agreement with the findings from several researchers, for example Selwyn (2014, p. 14) stated that ‘at the basic level technology is understood as the process by which human modify nature to meet their needs and wants’. Levin (1996, p. 36) also agrees with the definition by asserting that ‘technology is really a thing, it is better characterized as an approach- it is the application of scientific principles to solve practical problems’. The finding from research investigation reveals that majority refers to technology as a product rather than a process.

Question 3 (KNUST): What are Educational Technologies (EduTech)?

Interpretation and Analysis – This question helped the researcher to identify various definitions given to EduTech by lecturers at KNUST. The finding shows that lecturer 2 views EduTech as those processes that help in teaching and learning. She stated:

“ …. For EduTech, we talking about aids for education; those techniques that could be of help in educating students- imparting knowledge and skills”……Lecturer 2

This finding concurs with 1963 (p. 23) definition of EduTech given by AECT as its first definition of the term. It asserts that ‘*EduTech represents any physical approach by which educational instructions are presented to school learner*’.

However, there was a contrasting view to the above definition of EduTech, which was portrayed by the uniformity in the definitions given by the remaining four lecturers selected for this study. They explained that EduTech consist of both the approaches and physical technological tools which are been employed in teaching and learning.

“… for me, I see EduTech as the tools and systems that are put in place to enhance the process of teaching and learning”……..Lecturer 1

'…..These [EduTech] are the things we use to teach…. Sometimes we conduct exams in virtual classrooms, we use technology to record videos for our online learners or distant learners and many, many ways that you can talk about, you understand'……..Lecturer 4

Lecturer 3 also gave her elaborated meaning to EduTech by giving examples to simplify the concept of EduTech.

"Educational technologies can fall in a very broad very spectrum. These days we know that if you want to learn, teach and learn effectively, you will want to do a lot of work online so we have computers which are assisting that process; we have software that are assisting that process; then we have the world wide web which is available to us'……Lecturer 3

The definition given above explains that EduTech comprises of the product and process aspect of enabling teaching and learning. This definition is in agreement with the current definition of EduTech given by AECT in 2008, which takes into consideration all the tools and other approaches that are been adopted for teaching and learning. AECT (2008, p. 2) stated: *"Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources".* It could be seen that, the main aspect of EduTech is the product and process element of the definition of EduTech, and these were all displayed in the meaning given by all four teachers employed for this research investigation.

Question 4 (KNUST): What EduTech do you use regularly in your classroom activities?

Interpretation and Analysis – The outcome of the research investigation revealed that EduTech in Ghanaian universities are not only restricted to individual computers. The lecturers explained that the type of EduTech used in their respective classroom activities depends on the type of module been taught in the classroom. For example the lecturer 5 indicated the use of digital television, YouTube, and Microsoft office in classroom activities. The lecturers also indicated the use of online activity where they use learning

management software system called ‘module’ for discussions, submission of assignment and conduct test and quiz online. Lecturer 2 also expressed that she uses PowerPoint to prepare slides for teaching and keep these slides on pen-drives, which is easily to move about. She further asserts that, she makes students submit assignment to educational software to check for plagiarism, which leads to the quality of educational activities organized at the universities.

> *‘…. I use the Public Address system to be able to speak for all students to hear and also use the projector to display all my slides I prepare using PowerPoint……. To avoid cut-and-paste work, I make sure students check for their plagiarism level using software’……Lecturer 2*

In conclusion, the following are various EduTech that were revealed by lecturers as their main tool employed in their respective teaching deliveries: projector, whiteboard & marker, PA systems, Social media, plagiarism software, Microsoft office, laptops and computers.

Question 5 (KNUST): Do you think the use of EduTech increases student’s performance?

Interpretation and Analysis –This question provided the opportunity for lecturers to express their views with regards to whether their use of various EduTech benefits students. The lecturers expressed that the inclusion of EduTech in teaching helps to provide additional learning material which presents real live experiences to students, thereafter leading to better understanding and subsequent higher educational achievement.

> *‘...From my point of view, I can say that technology is aiding learning, teaching and learning because a lot of students are depending on the Internet to be able to get material to iron their understanding of whatever they pick from the classroom’……..Lecturer 3*

However, it was also noted from Lecturer 2 that, the inclusion of EduTech in teaching deliveries does not always translate into higher academic achievement. This is because if an instructor employs EduTech in a wrong way or engage in teaching a particular module,

which does not require such technological tool, students would not benefit from that module. She expressed this by stating that:

> *'…Well, it depends I mean whether for example, in the use of PowerPoint's-PowerPoint presentation depends on the kind of subjects that the person is teaching. For example, somebody teaching accounting, the use of PowerPoint may not serve his purpose because you are supposed to work examples and write or they use the blackboard or whatever. So, if you go and project, you will not be able to impart knowledge to the students so it depends on what the person is teaching or what the person is lecturing. If it's something that can, that PowerPoint can support, fine'……..Lecturer 2*

The outcome of this question highlighted the following benefits of using EduTech in teaching and learning:

- Teachers use the internet to publish their articles
- Helps teachers to mark multiple choice questions
- Helps students to read outside the classroom activities
- Helps teachers to conduct online exams for large number of students
- Makes teaching easier
- Prepares the students for future employment roles
- Provides the avenue for students to re-learn and enhances better understanding

Question 6 (KNUST): Do you attend seminars, conferences or any training and development programs, which enhance your use of EduTech in teaching?

Interpretation and Analysis – Seminars and training programs are various activities organized by school administrators and other related bodies to equip teachers and students with the necessary skills to use EduTech in teaching and learning. The availability of these programs shows the effective leadership that sees to the implementation of ICT in education. Lectures indicated that before they are employed at the universities, they have *pre-training* on how to use various technological tools in teaching. This was reflected by the expression of lecturer 2:

'*…largely before you become a lecturer you yourself would have had the basics*'…….…….Lecturer 2.

Furtherance to that, they also explained there are frequent seminars and conferences organized by the university to train the lecturers on how to use appropriate EduTech in their respective teaching deliveries. Lecturer 5 indicated this by stating:

> *'…Yeah, there are several conferences, workshops that are being done because yes, I personally have been a resource person in a couple of these workshops where we try to train lecturers on how to digitize their course materials, how to engage students in online discussions and so on and so forth'……..Lecturer 5*

Lecturer 4 also indicated that lectures are also trained on how the system works and the use any new software to work effectively:

> *'…. If you become an exam officer for example, how the university system works; how you will upload results for students to access and all that, yes, you will be taken through training to get familiar with it'……..Lecturer 4*

The conclusion to this question reveals that there is effective university leadership at KNUST that provides various training and development programs for lecturers to aid the adoption of EduTech in teaching. There was unanimous response from all the selected lecturers with regards to the availability of seminars, conferences and training and development programs at KNUST.

Question 7 (KNUST): What other factors are needed to be successful/improve your chances of using EduTech in teaching activities?

Interpretation and Analysis – In addition to training and development programs that are been organized by the university to aid in the use of EduTech at the university, this question provided the lecturers the avenue to state other influencing factors that aid the use of EduTech in Higher Education. Lecturer 3 expressed the view on the availability of resources as the main factor needed. His explanation also highlights the need for the availability of maintenance personnel. This was reflected in the statement below:

*'…In this university we need to get these projectors (right), install in all the classrooms because normally some of them will malfunction…., you try to turn them on, they don't turn on at all and then even the power supply situation... We [lecturers] need experts to fix these technologies for us'……..……*Lecturer 3

The explanation above also concurs with the expression from Lecturer 1. He pointed out that their inability to communicate effectively with other lecturers is as a result of the leadership policies of the university. He further added there are no efforts from the university to provide adequate resources to help lecturers to effectively employ technological tools in their activities. Hence, university leadership is an important factor, which influences the use of EduTech in teaching and learning. This assertion was derived from the statement below:

'…….the university does not make conscious effort to supply teachers with the necessary gadgets so if you are not somebody who is technologically savvy and you want to acquire the gadgets on your own, you tend to be behind. So, if the university can make efforts towards updating lecturers by providing them the necessary tools to work with because as we sit here we don't have intranets, you understand. Intranets that should create a linkage for lecturers to be able to communicate among themselves, especially at the departmental level because basically at the departmental level we teach courses that are related and we supervise student theses'……..Lecturer 1

The outcome of this question also revealed that, lecturer 5 explained that instructors could effectively use various EduTech only when the students who are the recipient of such information understand and ready to embrace the use of these teaching technologies, hence, it is very important to offer effective training to students at various universities before lectures' starts using these tools in the classroom.

'…….I think the recipient of our teaching process- I mean the students will also need to be trained on how to use these systems. Yes, we cannot ignore them that okay they should be able to browse and find their way through, those who need to

*be trained. Then, the technology we also use here should be made user friendly. It should be able to interface well with the systems we have here'……*Lecturer 5

Lecturer 4 also explained the importance of the information architecture on various universities website as an important factor which aids in using EduTech in teaching. He stated:

*'.. The websites of the universities must be very simple enough to attract students to go there and use the e-learning module….they [student] sometimes ignore it because it's complicated to use'…..*Lecture 4

In conclusion, the following are various factors stated by lecturers to be the most influencing factors, which could aid in the use of EduTech in the classroom.

- Training and development to teachers and students
- Availability of resources
- Information architecture of system websites or university software
- Maintenance personnel
- University leadership

Question 8 (KNUST): What are if any, possible consequences of using EduTech in teaching and learning?

Interpretation and Analysis – Notwithstanding all the benefits derived from the use of EduTech as indicated in question 5, this question provided lecturers the opportunity to explain some possible consequences of using various EduTech in teaching and learning. The lecturers explained that using EduTech could be a major distraction to student's effective learning. Adding that most students' employ these tools in a social way whiles class activities are going on and these activities are of major concerns to authorities in Ghana universities. This explanation was reflected in the statement below:

'……Most students use ICT tools in ways that re not good for their academics; these students sometimes play games and watch movies with YouTube on their IPad whiles classes are going on and these things distracts them'…Lecturer 4

Additionally, Lecturer 3 also explained that this advancement in ICT in school is fostering academic malpractices in terms of cheating in class on assignments. He pointed out that tools such as smart watches and mini iPad make students to refer to answers during certain examination periods, which are against the university's exams regulations.

> *'..Most of them [students] copy or refer to answers using their smart watches and calculators which is bad'*…….Lecturer 3

Furtherance to that, Lecturer 1 also believes the inclusion of ICT has made students dissociate from social activities.

> *'..Nowadays you find students not participating in social events due to their attachment with these technologies…. Some [students] prefer playing games at home than attending even university sports events'*……..Lecturer 1

Question 9 (KNUST): Do you think EduTech would displace the teacher in the future?

Interpretation and Analysis – The literature shows that the 21st century has witnessed the advancement in technology and that has led to the increase in ICT in education. Most researchers and other teachers are worried that the excessive use of these tools would render the teacher useless in the future. The response from this question however, highlights some important variations in the future relationship between teachers and EduTech. Unanimous views from four interviewees show that technology would only redefine the teacher's role but not to displace and render unemployment. Although the future teaching activities would be capital intensive, lecturer 2 is of the view that human interaction cannot be exempted in pedagogical practices:

> *'....The teacher probably will interact less in the classroom but be more of a desktop officer because whatever you are going to use in teaching must come from somebody. It is somebody's creativity, it is somebody's methodology that you'll use so the teacher will still have to create that and the technology will be used as a means of transmitting the teaching like what distance learners do'……Lecturer 2*

However, in contrast to the above, Lecturer 4 also believe that the teacher must constantly update itself with the current demands of use ICT usage to '*catch up'* with the needs of the students. Otherwise, lecturers who have challenges in the use of various EduTech would be displaced by the recent rise in the use of ICT in education.

> *'.. I believe every lectures must take it upon themselves to learn how these technologies work and to employ them effectively, if not feedbacks from students will let a lot be laid off*'…….….Lecturer 4

Question 10 (KNUST): In your opinion what is the overall effect of EduTech usage on student's academic performance?

Interpretation and Analysis – The outcome of the research investigation show that the use of EduTech has its relevance as well as detrimental effect on students; depending on the how it's been used. Lecturer 3 expressed that Educational Technology can empower teachers and learners, promote change and foster the development of twenty-first century skills.

> '*…Improving education quality is a priority for most developing countries in which governments are facing a challenge to identify efficient ways to use their scarce resources and raise the quality of education…... Educational Technology has motivated the students to get more involved in learning activities through which they become more active and more interested in learning'…..*.Lecturer 3

Moreover, Lecturer 5 & 1 also believe that adopting such technologies can enhance their communication with the students, reduce the teaching pressure caused by the course material preparation and make the lecture material available at the time of the discussion.

> *'..These technologies are helping us [lecturers] in many ways…. We can communicate with students and also check the quality of their [students] work online'*……...Lecturer 5

> *'…I send them [students] exams feedback through emails and its helping them get quick reply'…… Lecturer 1*

Question 11: How do you view the future of higher education in Ghana?

Interpretation and Analysis - Finding new ways to teach the digital generation, bringing down the cost of a higher education and ensuring that more students graduate are among the biggest challenges facing institutions of higher learning today — and meeting those challenges has never been more crucial than it is now. Lecturers argue that future educational directives should be redefined towards reduced cost of education to allow most students to enrol.

> *'.. I think the cost of attaining higher education should be reduced to allow high intake of students…. These [students] are our future leaders and so we must educate all of them'…*Lecturer 5

Lecturer 2 also expressed that one of the major challenges is overcoming digital inequality in the future, one lecturer said:

> *'…..The problem is not so much the devices themselves — most students these days have access to computers and smart phones — but the level of sophistication in using these devices to conduct research'…….. Lecturer 2*

This means that there must be consistent training programs with regards to the use of EduTech, which could enhance the future generation's ability to use emerging technologies so effectively. Additionally, Lecturer 3 noted that school administrators must provide all the needed tools to make educational activities so convenient for teachers and students.

> *'.. University authorities must provide lecturers and students a more conducive environment to learn by providing more technologies and training programs'*…… Lecturer 3

8.2 Interview Findings for UG

8.2.1 Introduction

Table 8.2 below presents the demographic information of interviewee from UG followed by the analysis of the main questions.

Table 8.2: Coding and Demographic Information of interviewee from UG

Coding	Gender	Age	Program of Teaching	Qualification	Teaching Experience
Lecturer 1	Male	31-40	Investment	MPhil	3 Years
Lecturer 2	Male	41-50	Economic	MPhil	2Years
Lecturer 3	Male	51 and more	Marketing	PhD	5 Years
Lecturer 4	Male	41-50	Finance	PhD	6Years
Lecturer 5	Male	41-50	Accounting	PhD	5 Years

8.2.2 Interview Analysis

Question 1 (UG): what is the difference between Education and learning?

Interpretation and Analysis – Lecturers at UG provided contrasting views on the concept of education and learning. Lecturer 2 & 4 expressed that education means having a more knowledgeable one passing on information to the individual by way of instructions given to acquire knowledge. They further added that education mainly occurs when an individual sits into a classroom for instructions to be given; this basically explains the narrow definition of education (Selwyn, 2014). On the other hand learning constitutes the individual's own act of acquiring knowledge, which could take place at any environment preferred by the individual. For example lecturer 2 stated:

> *'…. Education is more or less having someone standing in front of you and then giving you tuition and at the same time education is part of learning; Learning is*

the bigger picture and education forms part of it so you can learn in so many ways. You don't necessarily have to be in the classroom. Our children learn at home ok, and they pick so many things from us. It's a learning process but education is when you formally sit in the classroom. So, I will say education is a sub-set of learning processes'……Lecturer 2

In disagreement to the above, Lecturer 3 & 5 were of the opinion that, education involves imparting knowledge into an individual by way of teaching and passing on information. Whiles learning is an individual's personal act of acquiring whatever information is been given by an instructor. Hence learning is rather a sub-set of education. Lecturer 5 reflected in the statement below:

'....education more or less involves the instructor- more or less imparting. Learning is maybe more; I think learning requires a lot more of the student. So if you educate somebody, you have sort of teaching, passing on information. If the person learns, then he is actively participating in the process and being actively involved in acquiring the knowledge for himself, not just that somebody is telling him, so learning forms part of education itself'……Lecturer 5

All the Lectures employed in this research investigation expressed that education is preferably a process, since an individual passes through a several stages before knowledge is acquired. They believe education is a lifelong process, which has no end. They stated:

'.... Getting educated takes a while... You go through several stages'...Lecturer 1

'....Education is a process because it has no end…even after you attain the termination point which is a PhD, you still have to be doing research'...Lecturer 3

Question 2 (UG): How can you define the concept of 'technology'?

Interpretation and Analysis – This question provided the opportunity for respective lecturers to express their opinion on the concept of technology. Lecturer 2 explained that technology is the various processes employed for the production of goods and services. He stated:

'…. as an economist, technology is essentially is a method or the process that you use, you employ to achieve, to turn input to output essentially. Technology is a, whatever procedure, knowledge or the process that you use to transform input'……Lecturer 2

Lecturers 1, 3 & 4 also defined technology to constitute both the process and product aspect, which aids production process. They believe technologies are employed to assist in areas where human abilities are limited. Even though technology consists of both process and product, they argue that it largely consists of various processes that are employed towards a particular activity, rather than a product, by stating:

'.....Even if it is a robot, the way and manner it's supposed to function'……Lecturer 1

'..These are the machines and processes we use every day to assist our production process'……Lecturer 3

This means that physical aspects or products parts of technology largely require a particular processes to allow these product-technologies function- hence effective productivity can be achieved depending on how these tools are been programed (process) to work.

Question 3 (UG): What are Educational Technologies (EduTech)?

Interpretation and Analysis – The outcome of this question shows that, program of teaching at the university influences the perception on the definition of EduTech. Lecturer 2 once again, indicated that EduTech are just the various processes employed in the educational process to impart knowledge into students. He stated:

'...Any process that it involves- so that can be how textbooks are written, you know, how classroom instructions are given, how students get to work on their own'……Lecturer 2

There was however uniformity among the other four lecturers, which partly contrast the above assertion with, regards to the definition of EduTech. It was expressed that EduTech

is any product or processes that enhances the act of teaching and learning. By this, it is any instrument or applications that aid in the delivery of teaching students to acquire knowledge. Giving an example, it was noted:

> *'.....So for instance, instead of walking to the library you can access information right on a desktop sitting somewhere through the virtual means so it is used to enhance education'……Lecturer 1*
>
> *'Those computers and software programs together with various ways that we use these tools in educational activities'….....Lecturer 3*
>
> *'These are technologies that aids in the educational process. It could laptops or designs flows or projectors in teaching'……Lecturer 4*

The outcome of this questions shows that the kind of EduTech employed by Lecturers depends largely on the program of teaching, which creates a worldview about EduTech to teachers. As such, if a particular lecturer mostly employ tools such computers and calculators in teaching, that lecturer is most likely to refer to EduTech as only product, and vice versa.

Question 4 (UG): What EduTech do you use regularly in your classroom activities?

Interpretation and Analysis – This question provided the opportunity for lecturers to list various EduTech they employ in their respective teaching activities. The following are some of EduTech that were recorded from this study: Audio-visual, PA system, Microsoft PowerPoint, Email, Projectors, Whiteboard and makers, Recorder and Learning management systems

It is very important to note here that, even though the lecturer 2 refers to EduTech to mean only 'process', he list PA systems and Projectors as EduTech employed in his teaching delivery. It indicates that EduTech consist of the process and product aspect of technology.

Question 5 (UG): Do you think the use of EduTech increases student's performance?

Interpretation and Analysis – From this research study, all five lecturers are of the view that EduTech increases students' performance and has positive effect on educational activities in general. They believe the adoption of technologies such as the projector and the PA systems has made it possible for large classroom sizes to function effectively without any setbacks. This technology does not only make education easier, but accessible to all. Lecturer 5 stated clearly:

> *'.....and especially in our setting where classrooms can be big- where classes can be big. Standing on the chalkboard and writing is difficult but the projector, which is bigger screen, is still going to relate a lot more to what is happening'……..Lecturer 5*

This question highlighted some benefits that could be derived from the use of EduTech in teaching and learning. The following benefits could however be materialized when these technologies are adopted at the appropriate time and for the right purpose:

- Makes learning and teaching easier and faster
- Makes education accessible to all
- Enable collaboration
- Enhance research capabilities
- Motivates students to learning

Question 6 (UG): Do you attend seminars, conferences or any training and development programs, which enhance your use of EduTech in teaching?

Interpretation and Analysis – All five lecturers agree to the existence of training programs at UG. They expressed that UG organizes some training programs for lectures upon their assumption into office and also when new technologies are introduced, lecturers are trained on how these new tools work in order to fully incorporate into their teaching activities. Specifically, training programs are organized two times per academic calendar for teachers at UG to equip them with the needed skills, which facilitate their use of EduTech in teaching:

'....First of all when you get hired here first, you go through some orientation that will be part and then every year especially when they introduce new technologies in the classroom they take us through all this orientation to make sure that we are all on top of it'……Lecturer 4

It was also discovered that UG has an agreement with a Danish university with regards to providing effective training programs for lecturers on how to use various learning management systems to set questions and facilitate their teaching activities. This is an indication that the university leadership of UG has strong policies towards the use of EduTech in teaching and learning.

Question 7 (UG): What other factors are needed to be successful/improve your chances of using EduTech in teaching activities?

Interpretation and Analysis – In order to improve the chances of using EduTech in teaching activities, lecturers believe there must be a change in teacher's attitude to embrace the new era or digital revolution, which calls for the use of EduTech in teaching. They argue that some lecturers are reluctant to use new technologies and prefer the old ways of teaching which they are much more comfortable with. This was reflected in the statement below:

'...The teacher has to embrace the technology. Essentially, I don't know- some people say that they are old school so they get used to the old way of doing things but first of all the instructor has to embrace the new way of doing the thing otherwise there's no point, he won't do it'…… Lecturer 3

Lecturer 2 also argues that improvement in infrastructure would enable the instructors to conveniently adopt various forms of EduTech in their teaching activities. These infrastructures according to the lectures are the basic physical and organizational structures available to the university that facilitates the smooth adoption of EduTech in teaching and learning, for example Internet connectivity, constant power supply, required software and computers:

'...It is an infrastructure issue. I think if the infrastructure is improved technology usage will be enhanced in the university. Now people give up because you log on

[Internet] and the thing will be turning like [very slow], I think that is what is causing the problem but if you turn it on and it works perfectly I don't think people shall [use it]'……Lecturer 2

Due to uniformity in response, other factors that were pointed out are as follows:

- Good conditions of available technologies
- Experts to train users on how to use technologies
- Training for students
- Reliable power supply

Question 8 (UG): What are if any, possible consequences of using EduTech in teaching and learning?

Interpretation and Analysis – All five lectures argue that EduTech are doing more good than harm to its users. It seems very difficult to point out various negative effects of adopting EduTech, however, they believe it allows for academic malpractices and also disassociate its users from social gathering. They further added that EduTech makes some students and teachers lazy. Below are some major consequences, which were noted:

'…. You know, this thing [EduTech] makes our students lazy and also copy some answers onto their smart watches and phones during exams times and this makes them cheat others' ……Lecturer 2

'When we organize other activities they [students] don't come because they [students] will be playing with these tools'……Lecturer 3

'Students nowadays don't learn the actual processes of thinking through questions, rather they [students] just get the answers'.....Lecturer 1

Question 9 (UG): Do you think EduTech would displace the teacher in the future?

Interpretation and Analysis – All the interviewees argue that advancement in ICT would lead to different ways of teaching, hence teachers who do not undergo training to learn the effective ways of leveraging these tool would definitely be displaced. They

believe any technology requires the human capabilities in order to function in society, therefore users of these technologies requires constant training to get updated:

> *'…Anytime technology grows, there's a problem- Definitely we should expect that but then not necessarily displacing the teacher in the classroom but if you look at the teacher- if you are a teacher and you are not dynamic, I think it will displace you'……..Lecturer 4*

The outcome of this question calls for constant training and development programs, which are needed by lecturers to get equipped with any new technology.

Question 10 (UG): In your opinion what is the overall effect of EduTech usage on student's academic performance?

Interpretation and Analysis – According to the lectures, the use of EduTech in universities has improved students learning and teacher participation over some decades now. With the advent of the Internet and a variety of software and hardware applications, Lecturer 4 believes that educators have been able to transmit their knowledge to students irrespective of their geographical location. Lecturers further believe the benefits of using EduTech have far outweighed its potential risks.

Although the impact of EduTech in developing countries have been heavily met with much scepticism in recent times, lecturers believe employing these technologies in the right way helps to improve student's learning activities.

> *'If these technologies are employed in the right way in our educational activities, it has the potential of adding more added advantages to various educational activities'*…….Lecturer 1

Question 11 (UG): How do you view the future of higher education in Ghana?

Interpretation and Analysis – With the current state of the universities in Ghana, this question provided the opportunity for lecturers to expressed their respective opinions on areas, which needs improvement. Lecturers explained that since technology advancement

is on the rise, university leadership must set priorities right by way of providing training programs, adequate resources and teacher incentive.

They also argue that the future educational processes in Ghana would require huge classroom sizes and students must be trained so as to allow for smooth utilization of EduTech by respective teachers:

> *'.....teachers must be trained as well as the students- if they [students] don't like the way a particular technology is been used, they will be sleeping in the classroom or go out'……Lecturer 4*

> *'...we require that the future redevelopment policies would provide us [teachers] with all the training and resources we need to do our work [teaching]'……Lecturer 1*

> *'There must be more technologies which are in good condition for use which can stand the test of time at the universities'……Lecturer 2*

8.3 Interview findings for UPS

8.3.1 Introduction

Table 8.3 below presents the demographic information of interviewee from UPS followed by the analysis of the main interview questions.

Table 8.3: Demographic Information of interviewee from UPS

Coding	Gender	Age	Program of Teaching	Qualification	Teaching Experience
Lecturer 1	Male	41-50	Accounting	PhD	4 Years
Lecturer 2	Female	41-50	Marketing	MPhil	3 Years
Lecturer 3	Male	41-50	Economics	MSc	2 Years
Lecturer 4	Female	41-50	Marketing	MPhil	6 Years
Lecturer 5	Male	51 and more	ICT	MBA	5 Years

8.3.2 Interview Analysis

Question 1 (UPS): what is the difference between Education and learning?

Interpretation and Analysis – The outcome of this question saw a unanimous decision from all five lectures on what constitute education and learning. The interviewees all responded to the idea that education consist not only the act of imparting knowledge into an individual, but also all the necessary conditions available for an individual to acquire knowledge. This is referred to as the broader definition of education (Selwyn, 2014). It thus takes into consideration the act of imparting knowledge and the necessary and sufficient conditions that enables that process of education. On the other hand, learning as explained by the interviewees is the individual's act of learning what's been taught. They further added that an individual could go through the educational system without learning anything meaningful. The interviewees stated:

> '…Education *is a broader perspective. Education encompasses a lot of things so if you say education you are looking at a broader spectrum of things. I mean learning is specific so learning you can say ok, you want to learn how to walk, just walk but education probably you might have to look at the essence of walking and everything that has to do with walking. So, education is a broader perspective compared to learning'……..Lecturer 1*

The expression above also depicts that learning does not only take place in the classroom, it is a personal phenomenon which constitute the ability of the individual to accept or acquire a new skill or character. Lecturer 4 further pointed out that education is a 'process' rather than a 'product'. An individual from this perspective must go through a serious of stages during the education activities, which could lead to acquiring a particular behaviour or skill- learning as stated below:

> *'....I believe education is a lifelong process without an end but somebody can easily go through the educational process or system without learning anything. But in respect to learning, it's what you actually acquire through the educational system'……..Lecturer 4*

> *'……education never ends so it's a process'……..*Lecturer 3

Question 2 (UPS): How can you define the concept of 'technology'?

Interpretation and Analysis – The results from this question shows that technology is anything that could aid production process. Here, three lecturers mean that technology could be either a process or a product that could facilitate the production of goods and services. Lecturer 3 was of the opinion that technology encompasses more of a 'product' than a process. By a product, lecturer 3 indicated that it's any tool that could be used to assist productivity. Other lectures also expressed as follows:

> *'…Technology is anything that will help you do something easier. To make your work easy for you - Technology is equally a process. It keeps evolving day by day. It changes every day'……..…*Lecturer 4

> *'…Well, technology is any tool that can actually make it easy for any form of production process'……..*Lecturer 2

> *'…You can see it as a process in respect to say- you're using Excel, you need to go through some process to complete a specific assignment on it but you can also see it as a product when we're looking at, like a finished product like a car, a caterpillar or something. But, for you to be able to actually man or use these*

finished products, you need to go through specific processes to go through it'……Lecturer 5

Question 3: What are Educational Technologies (EduTech)?

Interpretation and Analysis – There was no difference found among lecturers with regards to the actual definition of EduTech. The results revealed that EduTech is any available product or process that transforms the pedagogical practices. EduTech has modified the way teaching and learning is delivered in this contemporary world. Lectures believe EduTech significantly contributes to the smooth functioning of the educational system.

'...So the means or the methods in delivering education - ..... How to use the Internet to deliver and also probably using the projector, your laptop, your computer. They are all technologies unlike the olden kind of delivery that you will see a teacher or a lecturer with a chalk or a marker. These days, because of technology, you go to a lecture hall, you use a projector. It helps in the delivery'……Lecturer 3

'...You can see it as a process in respect to say- you're using Excel, you need to go through some process to complete a specific assignment on it but you can also see it as a product when we're looking at, like a finished product like a car, a caterpillar or something. But, for you to be able to actually man or use these finished products, you need to go through specific processes to go through it'……. Lecturer 2

Question 4 (UPS): What EduTech do you use regularly in your classroom activities?

Interpretation and Analysis – Only few EduTech were revealed from this question. Lecturers from UPS mostly use the projector, computer, laptop, whiteboard and maker as well as the PA systems. The PA systems were recorded from all five teachers because of the large classroom size in UPS, hence lecturers needs the PA system to transmit sound or lecture across to all students in the classroom.

Question 5 (UPS): Do you think the use of EduTech increases student's performance?

Interpretation and Analysis – Lecturers are on the view that the use of EduTech in teaching significantly improves student's learning capabilities which in turn leads to higher academic achievement. Lecturer 3 indicated that the old ways of teaching limits how students acquire information, which hinders the overall learning activities of students.

> *'….. With respect to the microphone and the speaker, if you do compare to the manual where you go and shout, it's likely those certain students especially who sit at the back might not be hearing what you're saying. But, with the microphone and the speaker everybody enjoys or hears what you're saying and it helps with their performance'……L*ecturer *3*

Other benefits of using EduTech that were recorded from this question are as follows:

- Enhances clearer understanding
- Self-dependence in learning
- Allows for collaboration
- Enables students research
- Improves traditional way of teaching and learning

Question 6 (UPS): Do you attend seminars, conferences or any training and development programs, which enhance your use of EduTech in teaching?

Interpretation and Analysis – All the five interviewees at UPS indicated that the university organizes training programs three to four times yearly to give teachers the needed skills on how use various EduTech in their teaching activities. Lecturers also expressed that seminars are organized to explain to instructors the essence of new technologies and the effects of growing trends in technology. It can therefore be argued that the university leadership of UPS is effective towards the use of ICT in education and its implementation strategies.

> *'…there is a platform called module. Most universities with advanced technologies use it, ok. So there's a platform where the lecturer can go ok, go and*

*upload assignments. You'll just ask the students to go there, go access this assignment and submit it there, ok. So it all helps in facilitating the courses. And in order to be able to use the module, sometimes they call us we do seminar and they teach us how to use it so we do'……..L*ecturer *2*

Question 7 (UPS): What other factors are needed to be successful/improve your chances of using EduTech in teaching activities?

Interpretation and Analysis – Lecturers expressed that strong Internet connectivity is needed to aid the use of EduTech. They further added that poor Internet network hinders the smooth functioning of teaching and learning activities by stating that:

'.....Internet connectivity. In the part of the world where we find ourselves, Internet is a big issue. So, like the module I mentioned earlier, for it to work, you need Internet but unfortunately sometimes the Internet sort of misbehaves. In fact, the connection is bad; sometimes it's very slow. Sometimes it doesn't come at all. So, if Internet is up and running, we should have a better interaction'……lecturer 2

The study also revealed that for a smooth implementation of EduTech in the classroom, there must be skilled personnel to take care of any maintenance or training programs. The availability of maintenance team ensures the continuity of EduTech been employed in teaching and learning at all times. This question therefore shows availability of resources and training programs as the most important factor needed for effective use of EduTech in the classroom.

Question 8 (UPS): What are if any, possible consequences of using EduTech in teaching and learning?

Interpretation and Analysis – The outcome of this questions shows that several technologies distracts students from active learning. Lecturers argue that due to the emergence of Web 2.0 technologies, students engage their peers in social interaction rather than learning and achieving any academic excellence.

*'..... you see these Facebook, twitter and YouTube, most student spend much time there than learning ---- even when you take them [students] to the computer lad, they go Facebook whiles you [teacher] are teaching them with those computer'……L*ecturer 3

Another possible consequence that was noted is the ability to enable students engage in academic malpractice. Lecturer 5 expressed the fear that students in the near future would not actively learn; rather rely on these technological tools to 'cheat' during examination periods and other academic activities.

'....during exams time you find them [students] looking onto their smart watches and other electronic devices for answers and these are not good for proper learning and performing well under same condition with other students' ……....Lecturer 4

Question 9 (UPS): Do you think EduTech would displace the teacher in the future?

Interpretation and Analysis – Lecturers believe EduTech would not completely display the teacher, however, the advancement in ICT over year's calls for users to attend training programs to update them on how to use EduTech in teaching. Instructors who do not actively learn the use of EduTech would be 'replaced' by the more knowledgeable ones.

'.....It will depend on the kind of teacher because as we go along, the future is becoming more IT sort of, ok. So if you want to stay in business, what the teacher will need to do is to upgrade him or her ok, to take advantage of some of these things. So if you decide not to take advantage, then it might probably displace you. So that will depend on the teacher' ……..Lecturer 1

In contrast to the above, Lecturer 3 also argue that with the use of recording teaching activities and uploading it on online platforms for students to watch and learn, most teachers would be displaced. Students from these universities where online platforms are used would give little or no relevance to the teachers since they can access every teaching material online.

'…when all teaching materials are uploaded online, the teacher's presence is not needed and hence with time many teachers who rely heavily on the traditional way of teaching would be displaced'…….……..Lecturer 3

Question 10 (UPS): In your opinion what is the overall effect of EduTech usage on student's academic performance?

Interpretation and Analysis – Notwithstanding all the benefits derived from using EduTech as indicated above, some lecturers are of the view that excessive reliance of these technological tools would deprive students the ability to know the fundamental problems of society. Lecturer 5 argues that technology would create 'lazy' students in many educational institutions.

'…with time many students would rely solely on these tools [EduTech] to think for them in all areas of their lives and would not engage themselves to know the actual cause of problems in our society'……..Lecturer 5

On the other hand, lecturer 1 also explained that these EduTech would motivate the younger and emerging generations to actively learn and attend all teaching modules since the act of learning would be 'easier'.

'..When they [students] can learn and do all their assignments and get good grades it would motivate them [students] to be attending all lectures. Students who always find it difficult to learn finds education not worthy of having time for' …….Lecturer 1

Question 11: How do you view the future of higher education in Ghana?

Interpretation and Analysis – Lecturers expressed that the future of H.E in Ghana should see the introduction of advanced EduTech in the classroom. There must be adoption of emerging technologies to extend teaching to majority of students irrespective of their geographical location.

'…To me, higher education in Ghana should now go beyond the classroom. It shouldn't be the one that is restricted to the classroom. It looks like our

educational system is resisting technology in the room but I see that that should be the way to go' ……Lecturer 2

Lecturer 4 also believes that future university leadership should provide effective training to teachers and students on how to use emerging EduTech to leverage teaching and learning activities. She added that those training programs ought to be supervised by professionals and other related bodies who have the needed skills to effect a change.

'…We [teachers and students] training to learn how these tools [EduTech] works properly - These training must also be organized by experts to teach the right thing' ……....Lecturer 4

8.4 Interview findings for UCC

8.4.1 Introduction

Table 8.4 below presents the demographic information of interviewee from UCC followed by the analysis of the main questions.

Table 8.4: Coding and Demographic Information of interviewee from UCC

Coding	Gender	Age	Program of Teaching	Qualification	Teaching Experience
Lecturer 1	Male	41-50	Banking and Finance	MPhil	2 Years
Lecturer 2	Female	41-50	HRM	MPhil	3 Years
Lecturer 3	Male	51 and more	Marketing	PhD	4 Years
Lecturer 4	Male	41-50	MIS	PhD	6 Years
Lecturer 5	Female	31-40	Accounting	MPhil	3 Years

8.4.2 Interview Analysis

Question 1 (UCC): what is the difference between Education and learning?

Interpretation and Analysis – All five interviewee have similar view on the difference between education and learning. It emerged from the findings that education does not only include the various infrastructures available for students and teachers, but also the actual practices that goes on within these structures put in place. Lecturer 5 reflected this by explaining that education therefore consists not only the practices that enables the acquisition of knowledge, but various buildings and facilities put in place for teaching and learning to take place.

> *'... When you ask me, I would say the school buildings and textbooks made available together with other technologies to help the teachers to impart knowledge, for students to acquire knowledge'*……..Lecturer 5

> *'Helping students acquire knowledge by producing a comfortable environment to enable the absorption of ideas and skills'……..Lecturer 3*

On the other hand, learning was seen to be the act of individual acquiring what is been taught either by a teacher or a peer or the individual taking time to acquire particular skill or character. All five lecturers pointed out same views expressing that, the individual takes responsibility of the process of learning. This explains that learning is an internal act of the individual. Learning therefore forms part of education. As reflected:

> *'..You learn when you go to school…… learning is an individual act which makes that individual acquire a particular skill or character. …. That's why most students go through the educational system without learning or acquiring any knowledge'……..Lecturer 5*

> *'learning takes the form of individual participation of acquiring those skills being impacted by instructors in school… that's how come the students can learn everywhere and anywhere'……Lecturer 3*

Question 2 (UCC): How can you define the concept of 'technology'?

Interpretation and Analysis – The findings show that the concept is technology is wide and various definitions could be arrived at depending on the philosophical position of the individual. Lecturer 4 stated that *'technology is an application of science to solve real life problems',* whilst lecturer 1 also stated that technology is 'skill *and arts as well as those tools which are used to improve or produce we [humans] need'.* Lecturer 2 also stated that technology is '*the application of organized knowledge to practical tasks by ordered systems of people and machines.* These definitions given above indicate that several individuals have different views on the meaning to technology. Another definition given by the lecturer 3 explains that technology could be seen as the actual processes used to guide the activities on human in producing the needs of society – '*when you talk about technology to be it means employing ways and means to help us [humans] help our efforts to produce what we need'.*

Question 3 (UCC): What are Educational Technologies (EduTech)?

Interpretation and Analysis – There was a unanimous view on the concept of EduTech from the interviewees. All five interviewees view EduTech as any tool or process that aids the act of teaching and learning. They also expressed that EduTech are the various ways by which students facilitate their learning processes irrespective of any geographical locations. This was reflected in the following quotes:

> *'..These tools helps the students to learn wherever they are and still make success'……..Lecturer 3*
>
> *'… just say the machines or tools been used to help the teacher and the student as well school administrators to organize effective educational activities'……..Lecturer 4*
>
> *'… I see them [EduTech] as those computers and projectors we [teachers] use in teaching students and also to organize our online exams'…Lecturer 1*

Question 4 (UCC): What EduTech do you use regularly in your classroom activities?

Interpretation and Analysis – The findings shows that lecturers use different kinds of EduTech to teach depending on the program to be delivered to students. This was reflected by an expression made by the marketing lecturer 5 – *'We [teachers] all don't use same tools all the times, for example I teach marketing so I only use what I need most, and I believe other teachers to do so'.* For instance list of EduTech given by lecturer 3 are SAP CRM, Google Analytics, PA systems and Projectors, whiles that of lecturer 3 are the computers, whiteboard and markers, flipchart, calculators and YouTube videos.

Question 5 (UCC): Do you think the use of EduTech increases student's performance?

Interpretation and Analysis – This question brought out some key benefits that are derived in employing EduTech in teaching and learning. Lecturers believe that the introduction of technology into the classroom and beyond provide additional opportunities to all stakeholders in the educational system. There were also unanimous views on the use of EduTech, lecturers argue that these tools aids teaching and learning strategies that facilitates student's learning and boost their overall capacity to perform very excellent in academic activities. Lectures highly believe EduTech makes learning and teaching better and faster as well as motivating students to involve effortlessly in all educational activities. The following are some of the benefits of using EduTech that were revealed from the study:

- Help students to learn from irrespective of their geographical location
- Enables collaboration among teachers and students
- Makes teaching and learning easier
- Broadens the knowledge base of the students
- Promotes independent learning for students
- Easier access to information

Question 6 (UCC): Do you attend seminars, conferences or any training and development programs, which enhance your use of EduTech in teaching?

Interpretation and Analysis – The findings from this questions shows that there are no major or planned training programs which have been scheduled at the university to help both teachers and students. Although instructors take some time to personally learn some new technologies and apply them in the classroom. Lecturer 3 expressed-

> *'... for now I don't know of any training been organized for us [teachers], I personally learn how to use modern tools and help the students with it'…….Lecturer 3*

Lecturer 2 & 5 also expressed that only on few occasions has the university organized seminars to highlight the need to employ more EduTech where possible to teach students. They also explained that some of these training organized by the university are not effective enough to equip teachers with the needed skills to enable the adoption of EduTech in the classroom. Lecturer 5 affirmed by saying that-

> *'….these training are not good enough to help us [teachers] to be honest, we need more serious seminars and training programs, perhaps those conducting the training are not experts or skilful to make us [teachers] understand well'. ……Lecturer 5*

Question 7 (UCC): What other factors are needed to be successful/improve your chances of using EduTech in teaching activities?

Interpretation and Analysis – The study indicates that for teachers and students to effectively use EduTech in the classroom and beyond, there must be effective training and other related workshops that would equip users with the required skills and to know benefits of various EduTech. This for instance was reflected by the lecturer 4-

> *'…. We can only use these tools [EduTech] when we get the needed training on how to use it. You know we are moving towards the ICT era and the need to alert us [teachers] on what tools to use and when'……Lecturer 4*

Lecturer 2 also believes that after training programs are been organized; there must be availability of technologies to use in the classroom. She argues that without the available tools in the classroom, there would be a waste of time organizing training programs. Her assertion states:

> *'....there must be training for us [teachers] as well those tools to use. When we have the training and there are no technologies how can we manifest our ideas or what we have learnt? So I mean those tools are very important'…….Lecturer 2*

The outcome of the interview also shows that there would only be a continuation of the use of EduTech when the few existing technologies are maintained in a good condition. Hence, maintenance factor becomes an important consideration for effective use of EduTech by both students and teachers. Lecturer 4 reflected by stating –

> *'....at least if we could maintain the few technologies available, we can be ok for some time. ...These tools for teaching are left behind the moment they stop working and that's not helping at all'……..Lecturer 4*

Question 8 (UCC): What are if any, possible consequences of using EduTech in teaching and learning?

Interpretation and Analysis –This question pointed out some possible risk associated with the excessive use of technology by both students and teachers. Lecturers indicated that traditional methods of teaching kept some important information about students and teachers safer, however the introduction of modern technology has become more digital and allows students and teachers to put some of their information available for others to see- there is little privacy in the lives of human. Lecturer 1 reflected this:

> *'....in the olden day's information about our personal lives is safe because there is no medium to expose it…. As you can see lately, students can browse and fill some forms online, which make them more vulnerable for attacks and hacks. Some teachers also fancy more of these things [technologies] which expose them'……Lecturer 1*

The outcome of the question also shows that the introduction of technology into the classroom has made lots of students 'anti-social beings' as expressed by some lecturers. For example lecturer 4 argue that students sometimes don't even break away from the classroom to have some rest or food, they stay or whiles in the classroom they mostly use these digital technologies to 'chat' or 'play' with others. These acts according the lecturer 4 distract the students from any meaningful or effective learning.

> *'…Students sometimes don't go to break to eat or rest. They sit down after class and start playing with those games and other tools at their disposal….. Students sometimes play with interact too much with these tools that affect their academics even when lessons are going on'*……..….. Lecturer 4

Question 9 (UCC): Do you think EduTech would displace the teacher in the future?

Interpretation and Analysis- Teachers under this question believe excessive introduction of technology into the classroom would render teachers partly needless. They argue that the role of the teacher would then be limited to only helping students to further understand what they tried learning and needs further explaining. The actual educational system in Africa where the teachers is the supreme in the educational setting would be diminished by the introduction of technologies.

> *'…. Our [teachers] roles would be limited to just explaining to students what they [students] learnt and don't understand…. Students would take the centre stage and make us [teachers] lose our supremacy like before. Our supremacy I mean when we [teachers] organizes everything and take charge of all educational activities'*……*.*Lecturer 3

Lecturer 1 also argues that technology can only displace teachers who don't train and learn the use of modern tools in teaching. They believe students sometimes attend all classes because these tools motivate them to learn:

> *'…. Sometimes I observe more students when am using YouTube to explain some concepts in class. It means that they [students] like the video teaching than me [teacher]…… This means that with time teachers who don't employ more of these*

tools would be assesses and rated low by these teachers and subsequently lose your job'……Lecturer 1

Question 10 (UCC): In your opinion what is the overall effect of EduTech usage on student's academic performance?

Interpretation and Analysis – There was unanimous view on the overall effect of the use of technologies in the classroom. Interviewees at UCC argue that, introducing technology into the classroom would offer additional opportunities for students and teachers to interact and learn. They indicated that EduTech when employed in the right way would not only aid student's independent learning, but would assist in creativity and innovation.

'…. To be frank with you, these tools are helping us [teachers and students] in interacting well. For example, if I can't make it to class I quickly send a message through emails to the class Rep or share a note on Facebook'…….……Lecturer 4

'... These tools helps the educational systems but only when employed in the right way'……Lecturer 3

Question 11 (UCC): How do you view the future of higher education in Ghana?

Interpretation and Analysis – lecturers at UCC believe the future of Ghana's educational systems would not change hugely by depending on technologies. They argue that it has become difficult for authorities to purchase modern tools hence there would be reliance of some old traditional methods of teaching until more technologies are introduced.

'... as you can see, we don't have these modern tools so I don't see it [educational system] changing anytime soon. If we get all the tools and start using them like the outside world, yes then the future would be bright. These modern tools are very expensive and the school doesn't want to give us the opportunity to use them by buying for us'. …… Lecturer 5

8.5 Interview findings for Educational Technologist

8.5.1 Introduction

As discussed in chapter five the need to add educational/learning technologists to this study, this section aims to analyse all the outcome of the interview conducted among some selected technologists from the United Kingdom. Invitation email was sent to several educational/learning technologists in quest to solicit for their views on the subject matter. Five educational/learning technologists accepted the invitation to be part of the research and interviews were arranged. Due to time and other constraints, one interview was conducted over Skype, whiles the other four was a face-to-face interview at their respective offices. The interview took place between February and July 2017. Interview questions consisted of 14 main open-ended questions, which can be found at appendix A of the study. Even though the researcher had a designed set of questions, semi-structured interview approach was adopted and allowed the researcher to gain new ideas that was brought up during the interview as a results of further explanations offered by the interviewees. Table 8.5 below shows the coding and demographic information about the Interviewees for this section.

Table 8.5: Coding and Demographic information for Learning Technologists

Coding	Gender	Location	Years of Experience
LT 1	Male	University of Salford, UK	4 Years
LT2	Male	Manchester Metropolitan University, UK	3 Years
LT3	Female	University of Salford, UK	4 Years
LT4	Male	University of Salford, UK	3 Years
LT5	Male	University of Manchester, UK	5 Years
***LT* Denotes Learning/Educational Technologist**			

8.5.2 Interview analysis

Question 1: What is the difference between education and learning?

Interpretation and Analysis – With the special interest in researching in the field of how ICT could shape teaching and learning, educational/learning technologists were employed to share their opinion on the distinction between education and learning. There was an agreement between all five technologists with regards to the difference between education and learning. They all agreed that education entails the combination of teaching activities together with favourable environments that makes learning possible. Adding to that, education is meant to transform the individual by acquiring knowledge, skill or character that is needed for the management of the society. Whiles learning on the other hand, is the internal process of the individual- that's how the individual is able to acquire a particular skill or knowledge. These views on the difference between the two concepts were captured in the following quotes from the interviewees.

> *'Learning is very much the internal process that comes with the student so a student sort of go through various processes which are provided by education develops the total understanding of something which is based on their own context and that subject so that will be learning. Education is a very wider thing, which incorporates sort of curriculum design, teaching and sort of training. Education for me is a facilitation of learning so it's really sort of making some building a safe environment for students to be able to learn'……..* LT 3

> *'Education is mostly the arrangements, which are made by higher authorities, which could be teachers in schools, parents, and other individuals who know about a particular subject, and helping others acquire knowledge or skills. Learning could be looked at how that individual acquires that skills or character after been educated. So learning is a personal or an individual attributes'…*LT 2

> *'Education means all the practices that are given to an individual to get some form of skills or achieve a new character to do something, whiles learning comes into play when you are able to acquire that skills been given to you by the educator'……*LT 3

The above expression shows why people could go through the educational system without acquiring knowledge – learning. It also shows that education involved series of processes that is intended to shape the individual to be able to 'learn'. However, not all persons that go through the education processes acquire the intended skills or knowledge. Therefore learning is regarded as specific to what the individual does.

Question 2: How can you define the concept of 'technology'?

Interpretation and Analysis – There was a 'slight' difference among the five educational technologists with regards to technology. LT 1 & 4 argue that technology is anything that is only 'new' to the individual user, which was in opposition to the other two technologists.

> *'……. Technology often anything new to you, which takes over a process – which sort of supports you [user] – for example we don't really consider things like paper to be a technology but first invented as technology. Processing things for us to save us time, doing things for us and supporting us'*……..LT 1

LT 5 also explained that technology supports the user to facilitate production processes. With this argument, things that have existed for many years are not considered a technology- for instance paper

> *'…… Technology to me is creating those products to create another product. I see it more of a process because these processes are those that aid an actual project to be done. It's more of automation'*……*LT 5*

In contrast to the above, LT 3 also view technology as anything new and old that aids the user to accomplish a task. She further added that technology is a very broad term, which consists of both products and process. However, she viewed technology to be more of a 'product' than a process. This means that the 'product' supports various 'processes' initiated by the user to enhance productivity.

> *'….Anything is technology – I mean if you go back to the ancient times, an abacus was a technology. Pen could be a technology if you want it to be. Technology is a product'*…….. LT 3

Question 3: In your opinion, do you view technology to be a 'product' or 'product' or both

Interpretation and Analysis – There was uniformity among all five technologists on what constitute technology under this criterion. All five explained that technologies are those tools and other new ways of undertaking projects. Adding to that, it was discovered that all those new practices or means in producing other technologies are also referred to as a technology. It was further established that technology consist of the actual application of skills and knowledge together with tools in achieving the objectives of any project – hence technology is both a product and a process.

> *'… as you can see, it takes ideas to produce any tool or undertake projects…. for example an architect with his skills uses pens and papers to draw the blueprints of a house. Here technology is seen as a process and product'……*.....LT 4

> *'I think technology takes the form of the machines together with the ideas that helps it to function… so its looks to be both product and process'*…….. LT 5

LT 2 also explained that before any product-technology can be produced, it takes expert's skills, knowledge and other ideas to the design and realisation of such technology hence, technology should be seen as a process rather than product. For example industries or companies that deal with the production of consumer goods basically describe technology as a process. This assertion was captured in the quotes below:

> *'….all these machines we see today are as a result of ideas and skills from individuals who tried to invent these machines……. Then after these machines or tools are used to create new tool…. The creation of tools to create other tools. I see technology more of a process'*…….. LT 3

Question 4: What are educational technologies (EduTech)?

Interpretation and Analysis – Only one technologist had different view on definition of EduTech. All the other four technologists consider any product or process that supports educational system as EduTech. They further added that traditional ways of teaching

have been modified by the introduction of EduTech, which are making teaching and learning progress effortlessly.

> *'..... It's typically those products or processes that support how students and teachers interact: It's mostly the tools that enhance the activities of the educational system'*…… LT 2

> *'All those devices such as computers, projectors laptops and even the emails created to exchange feedback with students are considered EduTech… in short, they are technologies that facilitate the educational process'…… LT1*

In contrast to the above, LT 3 also expressed that there is '*no such tool'* call EduTech. She further added that any tool could be called EduTech when it's been applied in the educational setting. She asserted that there is no difference between technologies and EduTech- thus any tool becomes EduTech at the moment it's been used to fulfilled educational purpose. Same tool could be used elsewhere and mean differently, hence there is no particular tool or thing called EduTech.

> *'....Educational technologies to me are no different from other technologies because you can learn from absolutely anything. It's just how you choose to use it at that particular time. So, take a machine. If it's in the factory it is a machine but if you take the machine and put it in a university studio, it then it becomes a learning technology because people are learning from it. I don't think there is any difference between learning technologies and technology itself'*…… LT 3

Both definitions above regard EduTech as a 'process' and 'product'. This means that any design of curriculum to change the traditional ways of learning as well as any tool or product that is introduced to enhance the pedagogical practices in the educational system is regarded as EduTech.

Question 5: How useful do you find it using EduTech in teaching and learning in Higher Education?

Interpretation and Analysis – Selwyn (2014) argue the need to be an intense research into ICT in the H.E system to bring out its benefits. The question aided educational

technologist, who in their special fields have conducted several research on the subject matter to give out their perceived benefits of using technologies in H.E. Some of the benefits of using EduTech that were noted from this research investigation are as follows:

- Supports communication
- Aids in the storing of information
- Aids in presenting information
- Flexibility to teachers and students
- Collaborations with peers
- Equips students with digital literacy
- Helps in research activities
- Enable social interaction
- Enhances the quality of work by using plagiarism software

The above benefits explain that it's worth employing EduTech by teachers and students in their respective activities. These benefits can, however, be gained by using these EduTech in the appropriate manners.

Question 6: what are if any, possible consequences in using EduTech in Higher Education?

Interpretation and Analysis – This question highlighted the possible consequences from using EduTech in teaching and learning. The outcome of these study shows that excessive use of EduTech leads students, at times to indulge in academic malpractices. According to the LT 4, students in some circumstance copies answers to devices such as smart phones and watches and take into exams rooms. LT 1 also indicated that the use of technologies in the H.E leads to absenteeism by students who sometimes try to access learning materials online rather than coming to class. They also indicated that students are new to some technologies use such tools for social purposes before getting used to. LT 3 also view students-distraction as a possible risk associated with technology usage-students spend most time using these technologies to chart and play with peers.

> *'....The first time they [students] use virtual classroom for example, they [students] don't make it for learning; it's really important to the students, it gives them a*

chance, for the time they using a virtual classroom, it just gives them the chance to have a chart and have a play to get used to it a bit. Because chances are that they [students] can struggle to get into it'.....LT 3

***'……** students mostly absent themselves from class and loose those physical discussions that help to create friendliness among peers…. Sometimes students remembers more of the things they had been taught when they have that physical presence with their teachers…. technology only facilitate'*…….LT 1

Question 7: Have you done any research to ascertain the impact of EduTech on teaching and learning?

Interpretation and Analysis – With the exception of one learning technologist, all other four agreed to have conducted various studies into the impact of EduTech on teaching and learning. The findings from their respective studies all confirmed the same view on ICT. They pointed out that the inclusion of ICT into the classroom does not automatically translate into academic success, rather employing the technology at the right time yields getting good returns. They also concluded there are most programs that only need student-teacher interaction; hence the adoption of any form of technology is needless.

'Technology does not bring out good outcome all the time. It's when and how you engage it in your activities' …….. LT 2

*'For example there are some programs I teach that needs interaction so I don't use any technology at all, all the students gets it [lessons] well'…*LT 3

Question 8: What EduTech are you particularly familiar with?

Interpretation and Analysis – The educational technologists selected for this study listed below some EduTech been employed in teaching and learning. However, they explained that the choice or kinds of EduTech used in teaching and learning depends on the type or program the individual or teacher is engaging students with. Some examples are VLE, social media, laptops, Lego, posters, felt-pens, flip chart and projectors.

Question 9: What is the overall effect of using EduTech in the higher educational system?

Interpretation and Analysis – The outcome of this question shows that, benefits or risks associated with EduTech depend on how these technologies are used and who uses them. LT 3 argues that, these tool themselves does nothing, unless been directed to do a particular work by the user. In essence, the individual could benefit on the grounds that the right EduTech have been used:

> *'....It depends on the individual teacher, I mean some classes when using technologies would be fantastic, other courses use lots technologies and still be fantastic. It depends on who is leading the class and how they choose what sort of activities they choose to do. There are some skills that students have to learn like if you are to look at social worker or something, you can argue where there are not a lot of it [EduTech], you don't want to use a lot of technologies because you want the people [students] talking ...students have to learn the skills of talking to the people. But you can argue that there are areas of it where they [students] need to use the technologies like safety with children and online privacy and things like that, so it depends massively on what you are teaching and who is teaching it*' …… LT 3

Enhancing digital literacy is an important factor why technologists advocate for the massive use of EduTech (Selwyn, 2014). LT 5 expressed that, these tools have the potential to equip students with the needed skills for future skills, and hence the inclusion of EduTech in educational activities is very necessary. He noted that, the benefits of using EduTech in teaching and learning far outweighs the harms these tools cause its users:

> *'...But I do think it's important because every students are going to come out and want to go and work or something- they [students] have to be digitally fluent by the time they [students] leave university – they have to be confidents with social media – and confident with technologies – so building into the program gives*

them [students] an extra skill – where they graduate, what they [students] need to go into the world of work' ……. LT 5

Question 10: Would EduTech displace the teacher in the future?

Interpretation and Analysis – In uniformity, all five Educational technologists are of the view that teachers would take a different role in the future of higher education. LT 3 argues that, teachers would only facilitate the act of teaching and learning by explaining to students who do not understand any program been available online. This means that the role of the teacher will only be changed and not disappear completely, hence technology will not displace the teacher. LT 4 also expressed that, in recent time's most academic curriculum are design and uploaded online for access, hence little physical presence of the teacher would be needed.

'....I think teachers would take a different role, I mean you can learn stuffs online, you can go online and learn about just anything but there is a difference between learning and getting knowledge and learning to apply things- or transforming the way people think and the way people approach things and I think that's where the teacher would come in and also other students as well been a group- it means the teacher can facilitate learning. You know the stuffs but how you will apply it is the problem so the teacher would facilitate- that's a facilitator' ……. LT 3

'…… technology only facilitates teaching and learning so you would need the human being to teach the content of any program….. It is through the act of teaching that the teacher would perhaps employ any technology to enhance the act of passing on the knowledge. Students can only use these technologies to further and better their understandings in most cases'…….. LT 4

Furtherance to that, technologist believes teachers would solely be available to enforce the three E's in the educational system- to *enhance, extend* and *empower*. This would be in the form of inspirational words to empower students to enrol and take up academic courses.

Question 11: Should students and teachers always employ technologies in their activities?

Interpretation and Analysis – All interviewees under this question agree that technologies need to be employed only when it's needed. They argue that technologies themselves are not humans; hence they must be used when appropriate in assisting its users in various activities. LT 2 stated that '*these [technologies] are not humans, they only help us [users], so we only use them when it's needed and not for the fun of it'*

Question 12: What measure can aid the successful integration of EduTech into teaching and learning in higher education?

Interpretation and Analysis –The introduction of ICT into the classroom is important, however, expects believe there must be some measures put in place to allow smooth integration of ICT into teaching and learning. Technologists argue for proper training and development programs to instil the needed skills into both teachers and students as an important factor that could aid in the integration of ICT in education. They further explained that attitude of teachers and students are also another aspect for accepting any new technology for its usage:

> *'…..Well, there is a lot to do with skills – so both staff and the students are scared to try and use new technologies- they [staff] have to make sure students and teachers have a good experience so they are weary of trying something very new that might not work'……* LT 1

Availability of technologies [resources] is also an important factor that was revealed from this study. LT 4 expressed that teachers and students could only employ these tools to work when it's available and accessible. Adding to that, LT 3 pointed out that these tools ought to be functioning properly to motivate its users in using them often. In addition, LT 2 also believes university leadership must have a plan for its ICT implementation strategy which takes into consideration the purpose of EduTech and when it must be employed in teaching and learning.

'……. for example we are planning to give out every student tablets with our installed software so that each student has the same platform which will boost our teachings in the classroom…. Not many can afford these technologies themselves and we can't imagine they have it automatically [can't rely on BYOD systems]. We will initially run workshop programs to train students on how to use these technologies'……..…… LT 4

Question 13: What are the roles of university leadership towards achieving effective integration of ICT in the classroom?

Interpretation and Analysis – There was uniformity among all five learning technologists with regards to the role of university leadership in ensuring the implementation of ICT in education. They all agree that the higher authorities at various universities has the sole responsibility of providing students and teachers with the required training programs to equip them with the right skills in handling any technological device in teaching and learning.

'It their role to provide some form of training and workshop programs for teachers and students. This would in some cases help overcome the attitude problem of using new technologies'. …….. LT 3

Furthermore, LT 2 also added that university authorities should be able to provide the resources [technologies] to solve the problem of unavailability in the classroom. He added that university authorities ought to engage in advance research in finding the more updated ways to delivering teaching services - this will lead to realizing the current trend of teaching and learning hence the implementation of the current trend of ICT in education.

'They [university leadership] need to provide teachers and students with the devices and software for teaching and learning. There are some application software that are very expensive for the teachers to buy and use in teaching. They must engage in further research to know which technologies to provide'…. LT 2

Question 14: How do you foresee the future of higher education in the 21st century?

Interpretation and Analysis – This question aided the researcher in finding from the experts in the field of education and technology to foretell their projections in the higher education. It was discovered that the increase in technologies would change the role of the educator by solely facilitating learning. For example LT 4 argue that learners by the help of technology could access all information needed and would only need the physical presence of teachers for further explanations. This means that educators would travel to meet learners at their convenient place of meeting and time. LT 2 also indicated that almost 90% of pedagogical practices would be conducted over the virtual learning environment by the help of emerging technologies. Adding to that, LT 2 expressed that classroom sizes would decrease and there would be fewer roles for teachers to perform their duties since technologies will take most part of the educator's activities in the classroom.

> *'…..students would have the opportunity to download all the learning materials to read and teachers would only be called upon for further explanation which the learner finds it difficult to understand. ……with this, the teachers would have to travel and meet the learner at any scheduled place of convenient to the individual learner [student]… though it will be quiet expensive to carry out'……..* LT 2

Chapter 9.0 –Discussion of Findings

9.1 Introduction

This chapter highlights the overall summary of the survey and interview investigation conducted. The major outcome of the research investigation has been presented as well as correlation of findings to the literature review that were conducted in chapter two of this study. This is an important chapter of the research investigation because it provides the researcher the gateway to highlights how the research results reflects, differs from and extends currents knowledge on teaching and learning technologies. Simply put, this chapter demonstrates some form of knowledge about technologies in education by outlining the actual findings of the research investigation.

9.2 Summary of Research's participants

The expectation of the researcher was to gather and use 100 participants from each case study business universities in Ghana. However, some questionnaires were discarded due to unanswered sections of some of the questionnaires administered to students. A number of 99 survey questionnaires were used for the University of Ghana. In the same vein, 100, 97 and 100 survey questionnaires were used for University of Cape Coast, University for Professional Studies and Kwame Nkrumah University of Science and Technology respectively. A total of 396 survey questionnaires were used for the study.

The interviews were conducted among 20 lecturers from respective case study universities and 5 learning/educational technologies from the United Kingdom. The outcome of the interview 25 interviews conducted revealed some considerations and other concerns that need to be addressed with regards to the effective use of EduTech.

The findings propose that the inclusion of EduTech does not necessarily translate into academic success, rather depends on other enabling factors. The following are a synthesis of analysis derived from the interview.

9.3 Discussion of research findings

This section presents the summary of findings that emerged from the analysis of the survey questionnaires and interviews conducted for this study. It provided the avenue for presenting the brief overview of Ghanaian Educational systems with regards to their perceived views and use of technology into teaching and learning.

9.3.1 Gender make-up at the university

The findings from this research study show the existence of gender differences in Higher Education in Ghana. Although certain program of study at H.E attracts more women (or vice versa) than men, other researchers also pointed out that current gender patterns of HE could be explained by several factors. Researchers such as, HEPI (2009), Machin & Pekkarinen (2008), McCrum 1994 and Strand *et al*., (2006) are of the view that 'gendered cognitive difference' is one of the most important factors leading to more males than females at H.E. There are small gender differences in cognitive ability scores that have emerged in many, although not all, academic achievement throughout H.E. These differences generally show a slight superiority with respect to some literacy skills, as well as verbal and non-verbal reasoning, for females, and a slight superiority with respect to numerical ability and scientific explanation for males. This shows the difference in program of study that emerged from this research from Accounting, Banking and finance, HRM, Procurement management through to Health Sector management. Strand *et al*., (2006) further argue that males have also shown greater variation in cognitive ability test scores and academic assessments more generally, with females showing more bunching around central scores. Such variations in cognitive skills have, perhaps lead to the significant difference between males and females that studies at the School of Business in all four individual universities selected for the study. Apart from UPSA, which has more females (61% females) than males, the other three universities have more men than females at their respective Business School. This was reflected by KNUST (89% males),

UCC (62% males) and UG (62% males). In summary, there is a significant difference found between males and females at the universities in Ghana.

9.3.2 Concept of Technology and EduTech

There was uniformity among students from four different universities with regards to the meaning of technology. A large number of students (above 70%) from all four universities expressed their respective understanding by indicating that technology consist of physical or tangible and intangible aspect; thus the product and process aspect of technology. These respondents' perceived definition of EduTech was put forward by Reisman (2006) as 'the development of application of tools, machines, materials, and processes that help in the solving of human problems'. This definition concur with the definition given by Burgelman *et al* (1996) who explained that technology is embodied in people, materials, cognitive, physical processes that facilitates the production of goods and services. The findings Indicates that technology is both a tool and a catalyser and it can become a medium through which change can happen.

Findings from the research shows that majority of the students viewed EduTech as both a 'product' and 'process' in the field of education. This was affirmed by the uniformity of definitions given by majority of the students as 'the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources'. This is a definition given by AECT (2008) as the current definition of EduTech to take into consideration what technology does in the 21st century education. The finding affirms the works of Reiser (2012) who pointed out that EduTech ''*any physical approach by which educational instructions are presented to school learners*'.

According to Reiser (2012), this was the early meaning given to technologies in the classroom before 1963, and this referred EduTech as merely 'instructional media'. In contrast to the above findings, few students (6%) at University of Ghana referred to EduTech as only 'product' by indicating EduTech 'are the tools, machines and materials that helps in teaching and learning'. This definition concurs with Ahmad (2015) view, which explains that EduTech in its early days was just any physical objects that aids in

teaching and learning .By this definition, students are referring to EduTech as only the physical or tangible assets on the university that aids in teaching and learning and not the actual processes these technologies are used to teach. The conclusion, drawn from this question means that most students have a clear-cut meaning to EduTech, which basically describes the tools employed by the tutors and the processes adopted to deliver their course contents to students.

The findings from the interview also revealed that technology is anything that aids the production of good and service. Although it could be considered a process, majority of the interviewees indicated that technology largely constitutes those tools used to enhance productivity. This finding concurs with the works of Mackenzi and Wajcman (1985, p. 23) who indicated that 'technology can be seen in three ways: the physical objects themselves; the human activities that takes place in conjunction with these physical objects; and as the human knowledge that surrounds these activities'. Selwyn (2014, p. 14) also agreed to that view by stating that 'at the basic level technology is understood as the process by which human modify nature to meet their needs and wants'. Levin (1993, p. 36) also agrees with the definition by asserting that 'technology is really a thing, it is better characterized as an approach- it is the application of scientific principles to solve practical problems'. The finding from research investigation reveals that majority refers to technology as a product rather than a process.

From the study, EduTech is any technologies that are used in the educational system to aid the teacher and the student. The major understanding gained here explains there are no particular technologies called EduTech; rather any technologies that at any point in time employed to leverage educational activities are regarded as EduTech. For instance, a laptop or software could be used by a project manager in a company, but would be regarded as EduTech only when used in the educational setting. This means that, other technologies, which are used to create an enabling environment to aid teaching and learning, are referred to as EduTech.

This finding given above explains that EduTech comprises of the product and process aspect of enabling teaching and learning. This definition is in agreement with the current definition of EduTech given by AECT in 2008, which takes into consideration all the

tools and other approaches that are been adopted for teaching and learning. AECT (2008, p. 2) stated: *"Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources".*

9.3.3 Education and learning

There was a unanimous view among teachers and educational technologist with regards to the difference between education and learning. The study shows that education entails creating a conducive environment that leads to the more knowledgeable one imparting skills or character traits into an individual. On the other hand, learning constitutes the personal ability of the individual to acquire the said knowledge or skill from the process of education. This finding is in agreement with the assertion made by the Manpower Service Commission (1981, p. 17) which states that *' education are the activities which aim at developing the knowledge, skills, moral values and understanding required in all aspect of life rather than knowledge and skill relating to only limited field of activity'.*

The finding also depicts that learning activities is not mostly linked to only educational institutions; rather the individual could acquire knowledge from experiences and interaction with the environment. However, one common understanding derived is that, both education and learning helps the individual to acquire the skills and character needed to influence and change the society. The outcome of the investigation shows that lecturers at the university view education beyond the narrow definition to a larger extent. This concurs with Lynch and Lodge (2002, p. 23) who stated that 'whatever *broadens our horizon, deepens our insight, refines our reactions, and stimulates our thoughts and feelings educates us'*. The findings also show that education is widely viewed as a process rather than a product.

9.3.4 University leadership

Effective university leadership is very central to the growth and success of the university. Several research studies conducted on impact of leadership on organization's performance have shown a rewarding effect of leadership on several organizational variables such as satisfaction of its followers, commitment and overall organizational

performance (Barling *et al*., 1996; Dvir *et al*., 2002; Popper *et al*., 1992). As Arsenault (2007 p. 14) suggests, "Universities are definitively not immune to this need for effective leadership as they face similar challenges as any other organization". From the research finding, 96% of students at UPSA indicated they do not observe any effective university leadership that sees to the implementation of ICT into classroom activities. This was followed, by 67%, 59% and 57% of students from UGBS, KNUST and UCC respectively who also affirmed the absence of effective university leadership towards the implementation of EduTech.

This perhaps, accounted for the absence of training programs to help students with the needed skills to use various forms of EduTech in learning. This was revealed where above 70% of students from all four universities indicated the absence of training programs at the university. In spite of the enormous importance of effective leadership in higher education, concrete suggestions for specific development programs are scarce in these universities understudy. This is a challenge in leadership education in developing countries to which Ghana is no exception, thus the implementation of ICT is not a priority for most authorities in the H.E systems in Ghana. These training and development programs are necessary as indicated by Verbeke (2014) to give students the knowledge, skills for the application of technologies for their day-to-day activities. He further argues that employers/leaders should view training to be the creating of intellectual capital that contributes to economic success.

9.3.5 Availability of Educational Technologies

The outcome of the study revealed some major variations in the availability of EduTech at these universities. Per simple logical reasoning, students and teachers can only use any technological tool only when it's available; as such availability of EduTech is a very important factor for the effective integration of ICT into classroom curriculum. Almost all students (at least 96%) from the four selected universities indicated the availability of EduTech at these universities, however, at least 60% of students from KNUST, UCC and UPSA indicated that these technologies are not in good condition to enhance effective teaching and learning. 99% of students at UGBS agree to the good condition of the available technologies which aids both students and teachers in their respective

educational processes. This perhaps, accounted for the highest usage of EduTech by students from UGBS and UCC (96% of students), followed by UPSA (91% of students) and KNUST (89% of students).

9.3.6 Forms of EduTech available

It emerged from our study there are several forms of EduTech at universities in Ghana that aids teaching and learning. With the exception of UGBS, there was uniformity in the kinds of EduTech used by teachers and students at the various HE selected for this study. UGBS has four main EduTech that were not recorded by students from other three universities and these are: Sakai, Nikasemo, Balme library and Newspaper database. Other EduTech that were recorded from all the four universities are laptops, computers, projectors, whiteboards & marker, microphones & speakers, student emails, Wi-Fi, Flipchart, Duster, photocopiers, SPSS and mobile learning. It very interesting to note that UPSA also has a very unique EduTech called the Zipnet, which is available for students and teachers to aid their respective educational processes.

The list of various forms of EduTech above affirms the 'process' and 'product' nature of technologies in the educational field. In this instance, tools such as laptops, computers, projectors, whiteboards & marker, microphones & speakers, Flipchart, Duster and photocopiers can be termed as the tangible aspect of technology (product); these technological tools aids the 'process' of teaching and learning. Others such as Sakai, Nikasemo, Balme library, SPSS, Wi-Fi, student's emails, mobile learning, Zipnet and Newspaper database are intangible aspects of technology which could be called software which also aids the same processes of learning.

Majority of these students from UCC, UGBS, UPSA and KNUST employ various forms of EduTech in their private learning activities outside classroom curriculum. 80% of students indicated they use these technological tools 'all the times' in learning. From the research findings, tools such as calculators, highlighter, laptops, computers mobile phones, pen-drives, social media (e.g. YouTube, Skype, twitter), emails, search engines (Google scholar) and Microsoft office are employed daily by students to engage in their respective learning activities outside the classroom curriculum.

9.3.7 Benefits of using EduTech

Researchers in the field of EduTech have hugely lauded the benefits of technology in the educational system, from the Thomas Edison' 1910 declaration that digital films would systematically transform the system of education, which could make books outmoded (Israel, 1998) to the most recent development of employing the internet and social media for learning purposes. The outcome of the study revealed that the introduction of EduTech does not always leads to higher academic achievement. The use of EduTech therefore depends on the program of study and the skilfulness of the users of respective technologies in teaching and learning. When EduTech are employed in the rightful way to aid teaching and learning, the study revealed could yield the following benefits to various stakeholders in the higher education:

- Makes teaching and learning easier
- Makes collaboration more effective
- Broadens student's knowledge which enhances global learning
- Facilitate research activities
- Instil in students the required skills for future employment
- Easy accessibility and flexibility in acquiring information
- Helps to track the records and progress of students
- Increases student's understanding
- Enable better simulations and models

The outcome of the research with regards to the overall benefits derived from employing various forms of EduTech concur with the works of other researchers. Stratham and Torrell (1999) and ACOT (2000) explained that, the inclusion of technologies into teaching and learning increases interaction between teachers and students, which encourages effective collaboration and cooperative learning. Also in agreement is Waddoups (2004) who argue that EduTech increases student's motivation, which leads to strong attitude towards its usage and higher self-esteem. The finding also confirms the works of Means and Olsen (1997) and Dunleavy *et al* (2007) who believe the use EduTech by students is a passport to future employment and to gaining competitive edge in the global economy.

The findings above is in agreement with the reports from educational researchers such as Honey *et al* (2005), Waddoups (2004) and Bebell (2005) who believe that the adoption of technologies by students and teachers in academic activities helps students to get immediate feedbacks and improves communication and problem solving skills. They also argue that educational technologies help students and teachers to collaborate with peers.

Notwithstanding all the possible benefits listed about that could be achieved by the rightful use of EduTech, interviewees also believe overreliance on these tools leads to distraction from serious academic work, as most students use these tools to chart and socialize with friends. The findings also show that EduTech leads to academic malpractices in some circumstance. A more detailed risks associated with the overreliance on EduTech are presented below.

9.3.8 Consequences of overreliance on EduTech

It emerged from the study there are associated risks in using EduTech in learning. Students from all four universities indicated the existence of possible consequences in employing EduTech by learning activities. The largest number of students (97%) from UPS believed there are possible risks in using EduTech in learning, whereas only few students (13%) from UG are of the view that the use of EduTech brings some form of consequence to the student 'user'. Furtherance to the possible consequences, 43% and 78% of students from UCC and KNUST respectively believed there are possible consequences of student's overreliance on EduTech in learning. The existence of possible risks confirm the ideas of several other research (Oppenheimer, 1997; Wright, 2001; Jackson, 2004) who are of the view that over reliance on EduTech reduces students opportunity to socialize, and the risks of some students to physical problems such as repetitive stress injuries or eyestrain when using the computer. Other critics (Cooley, 2001; Blumenfeld *et al*., 2000) of the use of EduTech also express their concerns that when there is an increase in EduTech into the classroom, spending on other important programs such as music, arts and sports decreases.

The outcome of the study further shows that lecturers frequently use technologies in their teaching deliveries. Lecturers confirmed that students who are more exposed to

technology in their learning activities perform well, however, excessive use or overreliance on these technologies has detrimental effects of students if used inappropriately. Learning technologists expressed that instructors must be aware of potential hindrances technology can bring to students when teaching with technologies. Some negative effects of using technologies in teaching and learning that were highlighted from the study include; (i) technology turns educational experiences into games for students, (ii) students distraction, (iii) academic malpractices (iv) makes students' lazy. These findings were in agreement with research conducted by Cooley (2001); Valdez (2005) and Oppenheimer (1997) who argue that computers reduce student's opportunities to socialise and cause physical problems such repetitive stress injuries to students. In addition, the outcome of the study also confirm the ideas of Blumenfeld *et al*., (2000) who argue that students more often than not emphasize technology over learning, as a results students are able to create an attractive documents without understanding the concept in the core academic areas.

9.3.9 Factors that influences the use of EduTech

Students and technology engagement in learning has become fundamental element in the higher educational system (Selwyn, 2013). In an attempt to improve student's technology engagement, there need to be an enabling environment or sufficient condition that motivates student's use of EduTech. Although the use of EduTech largely depends on the program of study, the research findings further placed importance on some factors that heavily influences their use of EduTech in learning.

The outcome of the research, show that university leadership is vital for any educational initiatives to be included in classroom curriculum. Students, lecturers and learning technologists employed for the study suggests that leaders with ICT implementation ideologies impacts positively on the integration of ICT into classroom activities, and vice versa. The overall progress of the university depends largely on the initiatives of the leadership of the university in question. Borrowing from the ideas of Arsenault (2007), universities face several challenges just like any other company; hence they are not immune from the need of effective leadership, which would allow for smooth operations and effective administration system.

The findings show that, personal interest also becomes the main driving force that motivates students and enhances their strong attitude to engage in any activity. Regardless of the availability of technologies, student who does not have greater interest in ICT would not employ such tools in learning. This perhaps accounted for 100% and 98% of students from UCC and UPS respectively, who argue that personal interest in the use of EduTech is the most important factor that influences student's use of EduTech in learning. 98% student from KNUST also view personal interest as 'important' factors in aiding student's use of EduTech. This confirms the works of National Centre for Education Statistics (2003) who argue that 'lack of time and personal interest to become acquainted with technology and how to use it' is the most significant factor in using IC.

The research findings demonstrates that availability of resources or the infrastructural development is an important factor for successful implementation of EduTech in H.E. In addition, the condition of service of the available technologies also facilitates the frequent use of EduTech. This would encourage them to integrate ICT into their teaching. Dexter *et al* (2002) concur with the findings by also discovering that teachers are of the opinion that having their own computer is one of the positive factors that influence the perceived ease of ICT use. Culp *et al* (2003) also agree by arguing that providing teachers with a laptop, projector, and computer software would motivate not only students but also teachers in the teaching and learning process. When teachers have easy access to computers, this might give them sufficient time to prepare materials, search the Internet, and/or review the necessary software. Cooley (2001) and Valdez (2005) were further in agreement by indicating that teachers may make better use of ICT when they have the opportunity to use high quality resources and have full access to hardware and software.

The finding also shows that adequate training on the use of EduTech in teaching and learning is an important factor that encourages the frequent use of technologies in H.E. The training as indicated should not only include basic technological skills but also training on how to improve pedagogical practices. This kind of training will help teachers feel confident and competent while using ICT at the right time and at the right opportunity. Rodriguez and Knuth (2000) were in agreement by asserting that when

training offers real-life examples, it will help trainees to understand the best way and time to use ICT in teaching and learning.

Some of the factors that influence the use of technology in teaching and learning are "teachers' attitude, teaching priority, computer skills and teaching preferences". Researchers such as Bergquist and Pawlak (2008); Clark (1983) and Mumtaz (2000), all concur with the finding by asserting that Teachers' confidence in using ICT, experience, willingness, motivation, and the perceived usefulness of ICT in teaching and learning are some other important facilitators for the use of technology in education. Drent and Meelissen (2008) also agree by expressing that having strong ICT competence is an important factor in innovatively using ICT in teaching, although not more important than other factors.

9.3.10 Areas of consideration in the Ghanaian Higher Educational system

The findings show that educators in the 21st century need to heavily invest in technology. Students in recent times bring their own devices to the classroom and playgrounds, this increases the ICT infrastructure demands. Higher education institution who seeks to meet up with the needs of 21st century students will need to act and respond with robust access and upgrades in bandwidth. At the same time, higher education institutions need to respond to 'mobility shift' which would allow educators and students to be nimble and engage from anywhere.

Additionally, the education community needs to think about how the emergence of augmented reality devices from Google Glass to Oculus will transform campuses. These devices bring powerful questions related to how they enable students and teachers to maximize the educational experience. "Augmented reality is literally going to transform higher education," said an educational technologist, who also added that the benefits of being able to use technology to enhance learning opportunities in the classroom would be invaluable for students looking to compete in a global marketplace. Moreover, all of the thinking relative to technology investments needs to also consider security- thus universities need to balance empowering students with keeping them safe.

It can be argued no generation is more at ease with online, collaborative technologies than today's young people— "digital natives" (Selwyn, 2014), who have grown up in an immersive computing environment. Where a notebook and pen may have formed the tool kit of prior generations, today's students come to class armed with smart phones, laptops and iPods. This era of pervasive technology has significant implications for higher education. This was reflected from the research outcome, where more than 80% of students from all four universities indicated that excess technology in the classroom is a major area of consideration in the future redevelopment of H.E in Ghana. With the exception of all students from KNUST, more than 90% of students from UCC, UG and UPS expressed that there must be a 'link' between universities and industries in order to tailor university teaching curriculum to the demands of the companies.

Further to areas for future considerations, the findings suggests there must be training and development programs in the future – these are the organized training lessons offered to students to increase their desire for the use EduTech for learning. Given the current condition at the universities, students also believe students and teachers attitude towards the use of EduTech must improve in the future to embrace the desire to adopt EduTech in school activities. Some teachers and students reluctantly avoid the idea of technology inclusion into classroom activities. Community involvement in the educational system and classroom size recorded low response from all four universities, which means students those factors as areas of considerations in the near future. All these factors explained above create conducive environment for successful educational activities to be carried on.

In conclusion, the findings indicates the future of education is not finding the best way that get all students to pass the same text, rather in using the connections that technology enables to leverage the social capital of communities and inspire young learners to their dream, innovate and create. Higher Education's must work to build a centre where technology is respected for what it is: a way to connect their students to their future.

9.4 New findings about 'Educational Technology'

*** There is no particular technology called 'educational technology' ***

This research investigation has effectively offered unprecedented insights into the thoughts and ideas about what constitute educational technology. The literature presented various definitions of educational technology from several authors and associations who research on technologies in education. The definitions guided the researcher on what constitute educational technology. However, upon the interview conducted with experts researching in the field of ICT in education, it was revealed that there is no such technology specifically or particularly called '*educational technology'*. The findings contrast the views of most scholars found in the literature review, which referred to any product or process, which assists in educational processes as educational technology. The outcome of the interview shows that all technologies are design to assist humans in the production of goods and services. Hence, a technology could be referred to as 'educational technology' only when it's been employed at that particular time for educational purpose, but doesn't itself have the name as an educational technology. Explaining further, LT 3 added that same technology could be employed at different workplace and could be referred to as a different technology. For instance, a teacher could employ a projector, laptop and other devices in teaching, which makes these devices being referred to as 'educational technologies'. However, these same devices take different name when an employer, for example at the construction site uses the laptop to design and arrange working flows. This explains that technologies take the names and attributes based on where they are been used at a particular point in time. This finding was reflected from the statement below.

> *'....Educational technologies to me are no different from other technologies because you can learn from absolutely anything. It's just how you choose to use it at that particular time. So, take a machine. If it's in the factory it is a machine but if you take the machine and put it in a university studio, it then it becomes a learning technology because people are learning from it. I don't think there is any difference between learning technologies and technology itself*'…….. LT 3

9.5 Summary of findings and Implications for Higher Education in Ghana

After a careful and systematically presenting and analyzing all the results, the researcher deemed it important to present a conclusion on EduTech and its implication for teaching and learning.

Due to the large classroom size in universities in Ghana, projectors and PA systems has become the very basic technologies been employed in teaching and learning. It is therefore important to upgrade the EduTech capacity of universities in Ghana. This is because responses from the teachers and students indicate that they are all eager to use and learn new technologies that aim to improve the educational system. The findings show that the tendency to employ EduTech in the HE depends on the universities leadership in prioritizing ICT in education. The outcome of the study shows that there is an increase use of EduTech by teachers and students in their respective teaching and learning activities. The results show that EduTech helps to improve the activities in the higher educational setting. The overall benefits of using EduTech could be achieved if university leadership takes into consideration two main findings: availability of resources and training & development programs organize for teachers and students. These two main findings tend to have an interactive effect or interdependent on each other on the effective use of EduTech in the higher education. These factors have been detailed below from the results of the study.

9.5.1 Availability of Resources

Effective use of EduTech in the classroom can only be materialized when technology resources are available to teachers and students. This basically means having all the needed technologies at hand for its users. In the research study, teachers and students did not use some EduTech because it's not available. For instance lecturer 4 at UPS expressed: *'...for the online module to work, you need the Internet to work... if the Internet is up and running, we should have a better interaction'*. The study revealed that majority of the teachers is dissatisfied with the absence of right technologies to aid their teaching activities. The study also indicates that all students who do not normally use

EduTech across all four universities are as a result of unavailability of the technologies at various universities. This finding corresponds with the research conducted by Hardy (1998), in which he indicated that many teachers have major concerns about the use of EduTech in the classroom such as: lack of technological tools and low quality computer technologies.

The findings indicate that the 'availability' factor ought to consider several other elements such as infrastructure, maintenance and sourcing. These sub-factors help to ensure that there is continuity in the availability of technologies at the higher educational level. These sub-factors have be discussed as follows:

9.5.1.1 Sourcing

This sub-factor entails the purchasing of all needed technologies, for example the projector, PA systems, software and all other EduTech that were mentioned by students and teachers across all four universities. The buying of all needed technologies would solve the problem of unavailability as indicated from the teachers and students employed for this study. It is very important to note that buying of all needed technologies for teaching and learning would also require an expert who understands and can effectively identify the right EduTech to be purchased. Lecturer 4 at UPS stated *'..... Sometimes the authorities need to buy us [teachers] these tools because they are so expensive that we [teachers and students] cannot buy to use'.*

9.5.1.2 Infrastructure

These consist of various fundamental facilities that are needed to accommodate the purchased or available technological resources. In other words, for smooth operation of EduTech usage, there must enabling environments to allow for its usage. For example, for the PA systems to function effectively there must be constant power supply and other electric sockets fixed in the classroom. Lecturers at KNUST also expressed their dissatisfaction about the frequent power failures, which hinder their use of projectors and the PA systems. Furtherance to that, there must be Internet connectivity to enable teachers search for literature or use Internet related tool to teach in the classroom. As reflected by Lecturer 4 at UPS: *'...for the online module to work, you need the Internet to work… if the Internet is up and running, we should have a better interaction'*.

9.5.1.3 Maintenance

To ensure the continuity of the available resources, there must be effective maintenance structure. This sub-factor would keep the available technologies in operation and helps to increase its lifespan- thus having a strong bearing the availability of resources at the universities. Lecturer 3 at KNUST and lecturer 4 from UCC indicated that higher maintenance cost hinders their ability to use several higher order technologies in teaching. As reflected by Lecturer 2 at KNUST: '*sometimes it takes time and money to repair these projectors and computers, so I mostly write on the whiteboard when they [projectors and computers] are not functioning'*.

9.5.2 Training and development programs

Training programs are the second factor in determining the effective use of EduTech. This was reflected in the study as almost all the teachers and students stress the need for effective training programs to be organized by the university authorities. Lecturers from all four universities indicated the organizations of various training programs by their respective universities. However, there was no particular timetable or calendar for the training programs. The training factor has an impact of the availability of resources, and vice versa. Thus, when the resources are available to teachers, there should be an effective training to equip teachers and students on how to incorporate it into their respective activities.

Training as reflected in the literature review are the planned efforts by employers to provide program to facilitate employees' capacity to increase performance. The goal of training in this case is for lecturers and students to master the knowledge, skill, and behaviours emphasized in training programs and to apply them to their day-to-day activities. Training has a two-way impact of the availability factor: time and support personnel.

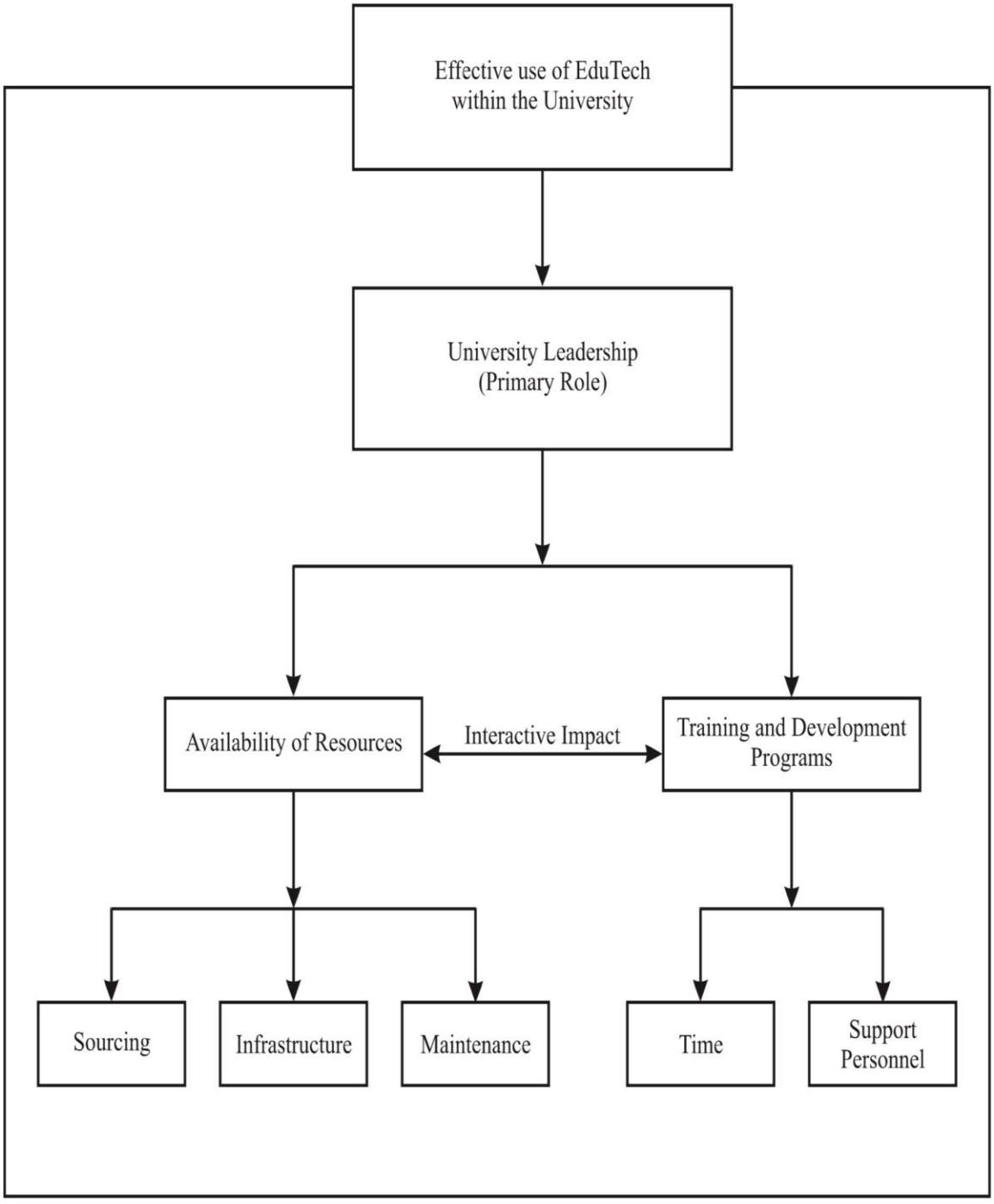
Time is an important consideration when arranging for training programs for teachers and students. This talks about the actual place, duration and convenient time for teachers and students. This was reflected in the works of Brace and Robert (1996, p. 327) who stated that '*faculty requires hands-on experience [through] workshops and orientations that are offered at convenient times'*. The expressions made by Brace and Robert indicate that

every training program needs a competent technician or expert to perform the function of organizing the training programs.

Lecturer 2 at UCC expressed the need for organizing trainings programs when lectures are free from teaching stress and by employing the right personnel to aid in any workshop: *'.... sometimes we [teachers] are just called to attend training programs without prior notice and for example I go there tired and don't learn anything……. the trainers also makes the tools look difficult to use, I think they [university authority] need to get experts or technicians to train us [teachers]'.*

This analysis, which has presented a unique model of features for effective use of EduTech in H.E in Ghana and other developing countries, is illustrated in figure 9.1below.

Figure 9.1: Model of features for effective use of EduTech in H.E



Source: Findings from the study, 2017

Chapter 10.0: Conclusion and Recommendation

10.1 Introduction

This chapter systematically presents the analysis of the research question and conclusion of the investigation. The research questions are linked to the aims and objectives of the study, hence, the overall illustrations of achieving the research questions are provided. Based on the conclusion derived from the study, possible recommendations are suggested to various stakeholders in the H.E and other related bodies. The overall aim of this research study was:

To explore educational technologies adoption in leading Ghanaian State Business Schools

This chapter in addition presents the contribution to knowledge derived from this research investigation. The limitations of the study are also highlighted together with future research direction. Lastly, series of difficulties and challenges encountered in the course of the investigation have all been presented.

10.2 Research Questions

The following research questions were the actual scope that guided the researcher in the attempt to gain clear insight the usage of educational technologies in universities in Ghana. In other words, answering the research questions helped the researcher to learn new or gain knowledge about educational technologies in the Ghanaian educational system:

- What are educational technologies?
- What kinds of EduTech do universities in Ghana mostly use?
- What reasons did teachers/students have for using or not using educational technologies in teaching deliveries?

- To what extent has the use of Educational technologies benefited teachers and students?
- What consequences exist in using educational technologies in H.E?
- What favourable conditions are required for effective use/integration of educational technologies in classroom activities?

10.3 Research Question Analysis

It becomes more important to provide a clear and better analysis detailing how the research questions have been answered for this research study. Under this section, each research question is presented followed by overall conclusion drawn from the research investigation and interviews conducted for this study. Information derived from the literature review of this study is also used to correlate the answers for each research question.

Research Question 1: What are educational technologies (EduTech)?

Survey Investigation – The definition of EduTech given by AECT in 2008, 1963, 1994 and Reiser and Dempsey (2012) were provided to respondents in an attempt to offer guidance to students to clarify understanding to the meaning of EduTech. Majority of students at UPS, UCC and UG (75% 51% and 50% respectively) expressed their perceived meaning of EduTech to be the definition provided by AECT (2008) which states: *study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources for teaching and learning*'. 76% of the respondents from KNUST also view EduTech as '*the tools, machines, and materials that helps in teaching and learning'.* The results indicates that majority of students have a clear meaning to EduTech. It is concluded at this stage of the investigation that EduTech consist of both physical tools as well as various processes employed in teaching and learning. The study therefore identified tangible and non-tangible technologies that are employed in teaching and learning as EduTech.

Interview Investigation – This stage provided a more detailed investigation about the concept of EduTech. It emerged that teachers have different interpretations to what constitutes EduTech and this largely depends on the program of teaching. Lecturers handling technical courses that require only software for teaching view EduTech as a process; whiles those that use Laptops and computers also regard EduTech as a product. However, 4 out of 5 lecturers from three universities (UG, KNUST, and UPS) regard EduTech to be a product rather than a process. Expressions made by some of these teachers are reflected below: '*'... just say the machines or tools [that are] were used to help the teacher and the student as well school administrators to organize effective educational activities'.*

It can be concluded that Educational Technology is as wide as Education itself. Educational Technology implies the use of all educational resources – people, materials, methods and techniques, means and media in an integrated and systematic manner for optimized learning. From the literature review and the research findings, working areas of Educational Technology includes the following: Curriculum Construction, Teaching-Learning Strategies, Audio-Visual materials, Determining Educational Objectives, Training the teachers, Feedback, Hardware and Software etc. In short, the scope of Educational Technology extends to all resources (human and non-human) for the augmentation and development of education. However, learning technologists were in disagreement with regards to what constitute EduTech. They argue that there is no specific technology called EduTech, rather any technology that at any point in time employed and used for teaching and learning could be termed EduTech. For example, laptops and computers are used at offices and other workplaces, but the moment they are used in the educational setting it could be referred to as EduTech. In other words, the laptop itself is not called EduTech; rather the function or role it plays in the educational sector describes it as an EduTech.

Research Question 2: What kinds of EduTech do universities in Ghana mostly use?

Survey Investigation – Results from the survey investigation identified several basic technologies, which are being employed by both teachers and students in their teaching

and learning activities. Students in their learning activities recorded similar EduTech among UCC, KNUST and UPS as the most widely use EduTech. These are calculators, laptops, Microsoft office, Social media, ruler, software, markers, SPSS, Wi-Fi, tablets, iPad and mobile phones. The survey revealed that the program of study affect the types of EduTech used as students who offers accounting at the universities all has calculators, rulers and markers as their main tools. University of Ghana has superiority over the kinds of EduTech made available for students to use in their learning activities. In addition to the above-mentioned technologies, University of Ghana has four main EduTech that were not recorded by students from other three universities and these are: Sakai, Nikasemo, Balme library and Newspaper database.

Interview Investigation – The interview analysis also highlighted some various forms of EduTech, which are been used by lecturers. Teachers expressed that different program of teaching allows the use of several other technological tools which other module teachers do not use. Lecturers across all four universities often use PA systems, due to the large classroom size and increasing number of students. In addition, teachers mostly use projectors, computers, laptops, whiteboard and markers, and YouTube during their daily teaching activities. Lecturers pointed out that all these technologies are only employed in teaching when needed. The outcome of the investigation shows the order of technologies, which are available in universities in Ghana.

Research Question 3: What reasons did teachers/students give for using or not using EduTech most often?

Survey Investigation – The outcome of the survey investigation depicts that majority of students from all selected universities uses various forms of EduTech in learning. All students from UPS agreed to the use various forms of EduTech in learning. Only few students from three university indicated they do not use any form of EduTech in learning. These are 4%, 7% and 11% from UG, UCC and KNUST respectively. Majority of these students who do not use any form of EduTech indicated that the absence of required tool makes them unable to employ technologies in learning. Furtherance to that, the absence of effective training for students has also made these students unable to use any technology in learning since they do not know how to use these EduTech effectively to

achieve any academic excellence. It seems only natural to suggest that these few students only see higher order technologies such as projectors, laptops, flip charts, and other related advanced technologies as EduTech, because pens, books, rule or even calculators are all technologies.

Reasons given by majority of students who uses EduTech in learning are reflected in the benefits of using EduTech in learning. Most students indicated that the use of EduTech makes learning faster and easy, helps in student's research, effective collaboration, equips students with the skills needed for future employment. A more detail benefits of using EduTech can be found in chapter seven under each survey investigation.

Interview Investigation – This section brought out a more detailed reason for teachers using or not using any form of EduTech in teaching. Most lecturers admit that, most often than not, they employ various forms of EduTech in teaching because it makes teaching easy and fast, offer a better explanations to students during teaching times for example by using YouTube or other videos in teaching, it helps in effective communication between teachers and students, aids in distance education and other online learning environments. Lecturers also expressed that due to geographical locations, EduTech has made education accessible to all students. Lecturers also added that they only refuse to use EduTech when the program of teaching does not require any form of EduTech, for example, HRM lecturers indicated that its course of teaching requires more of student's interactions, and hence there is minimal use of EduTech during its module teaching activities. Adding to that, the absence of required and good functioning EduTech has also rendered teachers their inability of deploying some form of EduTech in Teaching. In order words, the breakdown of the available EduTech hinders the effective use of EduTech in teaching activities.

Research Question 4: What consequences exist in using educational technologies in Higher Education?

Survey Investigation – The results indicate that more than 90% of students from all four universities use various forms of EduTech in learning. They all gave their perceived benefits of using these technologies in learning. Notwithstanding all the benefits derived

from the use of EduTech in learning, students also admit to the idea that EduTech has some level of risk it possess to its users especially students. This was a closed ended question and did not give students the opportunity to further explain any associated risk of using EduTech in learning. The researcher was informed about the closed ended question due to the results from the pilot study as indicated in chapter 6 of the study.

Interview Investigation – The interview investigation provided the opportunity for lecturers and educational technologists to explain any possible consequences of excessive use of EduTech in the higher education. Lecturers and technologists all argue that excessive or wrongly use of EduTech leads students to distraction from academic activities. Lecturers believe in recent times students substitute learning for socialising with emerging technologies in order to become conversant with them. Additionally, lecturers also indicated that the advancement of technology has made most students 'lazy' by not actively learning, rather engage in academic malpractices. For example, students copy and keep answers to exam questions on their smart watches and calculators and refer for the answers during exams period. This has led to exam authorities to disallow students bringing list of technologies in exams hall. On the other hand, learning technologist also added that the growth of EduTech has made lots of students losing the interest to meaningfully acquire any skill, because most students 'play' with these tools during class's times. Furtherance to the consequences, the learning technologists argue that EduTech also makes its users alienate themselves from other form of socialisation, since users get so attached to these EduTech and avoid certain human interaction.

Research Question 5: What favourable conditions are required for effective use/integration of educational technologies in classroom activities?

Survey Investigation – The outcome of the research show what students perceives to be the most influencing factors, which could lead to, the effective use of EduTech in classroom activities. Students indicated that for technologies to be useful in the classroom, it must be available. Secondly, training and workshop programs are needed to train students and teachers on the use of any new EduTech. Students also added that attitude of students/teachers in the use of any form EduTech play a major role in employing

EduTech in teaching and learning. This suggests that without a clear and good attitude to accept the inclusion of EduTech in teaching and learning, EduTech would not be a success. Students are of the view that provision of technologies and its associated training programs are made possible by the efforts of university leadership, hence a good university leadership with effective ICT policies are the backbone to the overall use of EduTech in the higher education.

Interview Investigation – lecturers and learning technologist also provided a better explanation to the required conditions needed for effective use of EduTech. Lecturers expressed that attitude of teachers and students to accept the use of modern technologies is very important. They further pointed out that even with the provision of technologies; teachers and students can only use it when they have a good attitude or deep affection for the use of EduTech. In order to aid and promote good attitude among users, teachers believe good training programs organized by experts are needed to equip teachers and students with the required skills- this is the surest way to convince its users and highlights the benefits that could be derived in using technology of any form in teaching and learning. Learning technologists also concur with the views from the teachers, expressing that the preparedness of teachers/students is very vital in the inclusion of EduTech in higher education. Learning technologists were also of the view that providing technologies together with effective training programs are very vital for the use of any form of EduTech in teaching and learning.

Research Question 6: To what extent has the use of Educational technologies benefited teachers and students?

Survey Investigation – Having indicated several benefits of using EduTech, more than 80% students from all four universities specifically indicated that the use of EduTech has improved their learning processes. In other words, the use of EduTech motivates students and aids them in every aspect of their educational activities. This perhaps, is as a result of satisfaction derived when their respective teachers use EduTech in teaching. The results show that more than 70% students from all four universities are happy and satisfied by their teacher's use of EduTech in teaching.

Interview Investigation – This aspect of the data collection provided a more detailed explanation from teachers with regards to the extent to which EduTech has benefited users in the higher education. Lecturers expressed that the introduction of EduTech into classroom curriculum has increase student's class attendance, which has systematically led to student's engagement in classroom activities. They also argue that there has been quality in work submitted by students by using plagiarism check software such as Sakai at the University of Ghana. There is also free online plagiarism check software available to any students to use- all these have been made possible by the advancement of technology.

10.4 Conclusion

Marshall McLulan, a Canadian professor in 1964 coined a very famous phrase, '*the medium is the message*' – which strongly proposes that the means to everything is sometimes the end. This statement of expression could hugely be related and applied to the idea of educational technology and its direct impact on higher education in the 21st century. Educational technology has become an agent of immense change as highlighted in the findings of the study. It has publicly announced our present knowledge economy and given rise to a generation of students who have never known life without a computer.

The changes EduTech is bringing will have a significant ripple effect on higher education. The research findings shows that, over the next decade advanced technologies will put education within the reach of many more individuals around the world, and will allow greater specialization in curriculum and teaching methodologies than ever before. With these benefits comes the challenge of ensuring that university infrastructure and operations are in place to support the adoption of technology on campus. As ever, administrators will need to weigh carefully how budget funds are spent, decide what emerging technologies show the most promise, and determine how best to support these technological advances while avoiding the ever-present risk of obsolescence.

But perhaps the most critical question facing the academic world is something far more fundamental- namely, what it will mean to be an educated person in the 21st century. As our study indicates, these sweeping technological changes will effectively change the skill-sets of the future workforce, as well as its approach to work in general. As a result, societies around the world will need to consider how to make the most of these new opportunities and thus ensure that they remain competitive in the global marketplace.

10.5 Emerging Outcomes

Based on the comprehensive review of literature and the research investigation, were some emerging outcomes that are significant to the field of educational technology in developing countries. The following are series of outcomes that were achieved from the research study:

10.5.1 Educational Technology Terminology

While different definitions and examples were given by the literature review it was the interview with learning technologist where it became evident that there is no particular technology called ‘educational technology’. The literature in brief labelled all those devices and various processes that are adopted in teaching and learning as EduTech, however, from the five interviews with learning technologists, L3 (learning technologist 3) expressed that there is no such technology called EduTech, rather technologies are at a point in time referred to EduTech when it’s been employed at that very time of teaching and learning. This explains that same technologies could be employed in the construction-working site and may have a varied name as well as its functions. It can therefore be concluded that devices such as laptops and projectors are referred to as EduTech as a result of its usage in the classroom and may also be called an ordinary technology when it’s been deployed by an engineer. Hence, there is no particular technology called ‘Educational Technology’, rather its place and time of use enables the concept and its meaning.

10.5.2 Higher Order of technologies in the Ghanaian Higher Educational Sector

While the literature presented several forms of EduTech, which are available to the stakeholders in the Higher Educational sector, the questionnaire findings and interview conducted highlighted the main form of EduTech which are available to students and instructors in the Ghanaian Higher Education. The main technologies which were mentioned across all four universities were PA systems, whiteboards & makers and projectors. The interview findings show that due to large classroom sizes, lecturers are forced to use the PA systems in the teaching deliveries irrespective of the program of teaching. Other significant technologies that were recorded are Sakai (in the case of blackboard in the UK), Zipnet, Balme library, Internet facility, laptops, flipcharts, social media usage (such as YouTube), students' email, photocopiers, SPSS and Microsoft Office suite.

10.5.3 Adoption of Conceptual Framework for effective of Technologies in H.E

The literature reviewed offered a good and considerable understanding of educational technology and its related factors that needs to be in place for the realization of ICT in the Higher Educational sector. Internal and external factors were highlighted which serves as a checklist which enables the use of technologies in the classroom. The internal factors are the factors within the university, which allows for the utilization of technologies for teaching and learning, namely university leadership and attitude of users. The university leadership according to the literature is highly responsible for providing the technological resources and training programs for students and teachers. The role of the university leadership was confirmed by the findings from the questionnaire and interview outcome. The external factors are those elements, which are outside of the university working environments, but have a tremendous influence on the use of ICT in H.E. namely, government policies, industry-university relationship, technology advancement of the location and demand for access to education. It was further added that government owe it a responsibility to provide funds to support Higher Educational institution and also help in maintaining peace and security to allow for educational activities to take place.

10.5.4 Implementation of ICT in Higher Education

The findings from the questionnaire and interviews conducted provided a model of features that allows for effective utilization of technologies in the Higher Educational sector in developing countries. The findings show that university leadership owe it a primary responsibility to provide technological resources and training programs for lecturers and students, as confirmed by the conceptual framework provided above. In order to ensure the continuity of technological resources, university authorities must buy (source) all needed resources and provide the basic infrastructure that would accommodate the available resources for example Internet facilities to access online materials, air-conditions to cool down the heating temperatures of projectors in the classroom. Furthermore, to ensure continuity of technologies to function properly, there must be effective maintenance structure, which will help keep the lifespan of technologies for longer periods. The second main role of the university leadership is to provide training programs to equip teachers and students with the technical knowhow. As shown from the study, these training programs must be organized by experts in the field of Technology adoption and at convenient times to the teachers and students. This model of features has been broadly explained in section 7.19 in chapter 7 of the study.

10.5.5 The Future of Higher Education in Ghana

The findings presented some technologies, which are available at universities in Ghana. However, there is little or poor training offered to students to acquire the technical knowhow in order to manage these technologies more effectively in their learning activities. Even though there is no formal or structured policies which are followed in training lecturers at the universities, most lecturers are able to deploy various forms of technologies in their teaching deliveries due to their own personal effort in learning the management of these technologies in teaching. Students and lecturers indicates the future of Ghana Higher Education sector depends largely on the policies of university leadership which should aim at providing more training and development programs to instil the digital literacies into users in order to eliminate the element of '*poor user attitude*'. The findings also show that universities must liaise with industries to train students for their future employment positions.

10.6 Recommendations

10.6.1 Recommendations for Academia

Universities are considered the main stream, which provides the private and public sectors with the needed labour force, which helps in the production of goods and services. Hence, it is very vital these labour forces provided by the universities are equipped with the necessary and sufficient skills, knowledge and other qualifications that will aid them to effectively cope with the overall requirement of their respective future employment positions that each labour force intends to occupy. University leaderships are highly required to have an industry-university relationship that will lead to the establishment of employee engagement strategy, which would enable the universities to know the actual skills needed in the world of work. Knowing the actual digital literacy required by the industries would enable the universities tailor their adoption of technologies and other related skills in their teaching curriculum.

Leaders at various universities should be readily available to support all teachers and students with training programs on the use of technologies in the classroom. These training and workshop programs should be organized at the convenient times of the teachers and students so as to enable them prepare fully for such training activities. Professionals in the field should organize the training programs so as to fully reach out to students and teachers with a more convincing approach to using EduTech and teaching and learning. Having stressed on the need for training programs is another interacting factor as availability of resources. University leaderships should provide teachers and students with the needed technologies to use in their educational activities; this solves the issue of unavailability. There must be support personnel to help maintain these tools when they breakdown or malfunctions. This would ensure the effective usage and continuity of EduTech in the universities.

The ideas of reward systems are very sensitive to the teachers at higher education. Rewards at the higher education should be distributed based on efforts made by respective teachers rather than on favouritism or any form of prejudice. The absence of fairness would adversely affect the performance of lecturers in their teaching roles at the

universities and consequently leads to mistrust between teachers and university leaders. The findings from the study shows that inclusion of technologies into classroom curriculum does not translate into academic achievement, rather also depends on how these tools are deployed in teaching and learning. Rewarding systems in universities would be a motivating factor for teachers to effectively teach and help students in all aspects of their lives. University leadership should show effective care, respect and support to all its members so as to create an idea culture of collective decision making.

10.6.2 Recommendations for Ministry of Education

The research found out that higher education in Ghana is directly under the administration of ministry of education (MoE); hence the MoE has some level of influence on universities in Ghana. It is therefore appropriate for the MoE to fully inspect and assess the performance of all higher education institution with regards to the favourable university environment that should be readily available for teachers and students to undertake any meaningful activity. The researcher in addition suggests that leaders in various higher education institutions in Ghana should request the assistance of the MoE to purchase any technologies for teaching and learning which is expensive and beyond the reach of the university. The MoE has to equally establish several engagement procedures that effectively enable all stakeholders in the higher education to understand essence of EduTech in this 21st century education and how to use various EduTech to help educational activities. This would aid the universities to have a sense of attachment to the MoE.

10.7 Limitations to the study

A limitation of study is the systematic bias that the researcher did not nor could not control and which could inappropriately affect the results (Price and Murnan, 2004). The researcher employed a high level of strictness and care whiles observing all research ethics to design the research and data collection and its analysis. In order words, Limitations in a research are the influences that are beyond the control of the researcher: They are more or less the flaws or conditions that the researcher cannot control and

places restrictions on research methodology and conclusion drawn (De Vos, 2005). Below are a number of limitations to this study which are highlighted:

- Lecturers from each case study universities (Business schools only) were invited to participate in the study. Large numbers of participants were recorded; however, there was repetition of answer to several questions by the interviewees. This affected the number of interviewees (5 Interviewees from each case study university) who were finally accepted in the research- thus; there was small sample size of the lecturers interviewed for the research.
- Only four individual case universities were selected for the researcher investigation due to geographical location, time and financial constraints of the researcher. The researcher lives in the capital city of Ghana and has most universities including the first established university of Ghana. The location of the researcher together with the advice upon interaction with members of the National ICT Policy and Plan Development Committee in Accra informed the decision to select the institutions involved in the study.
- There are many stakeholders in the higher educational system, however only three stakeholders were considered namely; lecturers, students and learning/educational technologist. Other stakeholders like the heads of department agreed to participate in the research, however, failed to make time for the interview. The replication of this research with more/different stakeholders would empower better generalizability of the discoveries of the study.
- The researcher employed the interpretivist philosophical assumption for this study as the main research paradigm. The researcher's philosophical view was shaped by the need to interact with the selected stakeholders and interpret their respective views of the use of EduTech, other than using a pre-defined formula or system to explain the issues about EduTech in Ghana.
- Through the empirical practice with heads of department from the case universities, the researcher found through observations that most teachers were reluctant to be interviewed for the study, which could lead to revealing some negativity about their department's assistance to teachers and students with regards to EduTech. Therefore,

the researcher visited other teachers many times before succeeding in getting any number of teachers who are willing to be interviewed for the study.

- Lastly, this study depended generally on qualitative philosophy of information gathering (though quantitative technique was used to a restricted degree) and is therefore restrictive. Therefore, quantitative technique of information gathering ought to be attempted in future to give more extensive point of view to the present study to provide a comprehensive picture to the given subject.

10.8 Research Contributions

The hallmarks of most doctorates are generally acknowledged to be an autonomous body of work that makes an original contribution to knowledge (Gill and Burnard, 2012). The following are some of the main contribution to knowledge about EduTech in higher education in Ghana.

- Systematically reviewing the literature in Educational technology in general highlighted significant complexity in identifying some conceptual framework for effective use of EduTech in higher education. This EduTech conceptual framework model contributes to the theory of knowledge base, which could be as a checklist for any developing country for the prospect of implementing ICT in higher education. Details of this framework have been presented in chapter 3 of this thesis and illustrated in figure 3.1. The framework confirmed the relevance of external factors such as government policies for higher education, industry-university relationship, and technology advancement of the country or location and demand for access to H.E; and internal factors of the higher education such as university leadership (primary role –training/development programs and availability of resources) and attitude of faculty members and academic culture. This framework has been proposed to fill the gaps between the available literature and practice.
- As the research progressed to the analysis stage there were some unique findings that emerged from the questionnaire and interview analysis and this is presented in chapter seven of the thesis. The findings presented the internal factors that need to be considered within the University for Effective Implementation of EduTech in

teaching and learning. It briefly describes the primary role of the university leadership in the form of providing training and resources in within the university. These two factors (training and resources) have a strong interactive effect on each other to enable effective use of EduTech in higher education in Ghana. This is illustrated in figure 7.2 in chapter seven of the thesis. This model of features for effective use of EduTech can be applied to other developing countries as a checklist within universities that can aid in the application of right technologies in teaching and learning.

- The researcher selected and studied views on the employment of EduTech from teachers and students from business schools in four universities in Ghana. The researcher under investigation experienced very active involvement by these participants about the concept of EduTech. This systematic practice aided in getting insight into the list of higher order EduTech available among these universities. The researcher ranked the University of Ghana among others as the most promising university in terms of the availability of EduTech and training programs offered to teachers and students. This particular domain of research has not been undertaken in EduTech usage among higher educational systems.
- The research study offered the opportunity to explore the higher order of educational technologies that are been readily available in the Ghanaian higher educational sector; among them are projectors, marker & white boards, PA systems, Wi-Fi, sakai (plagiarism checker), Nikasemo (equivalent to blackboard technology), flipchart, computer labs, photocopiers and other software for such as SPSS. It also aided the researcher to discover that UGBS is the only university that offers its students, lecturers and other staff member's higher range of technologies for their academic activities.
- Based on the findings of the current study, the inclusion of ICT into academic activities does not automatic translate into any higher performance nor achievement. This means that the appropriateness of use in the educational sector is the most important elements towards achieving successful outcome in its implementation.

10.9 Future research directions

The future research directions highlighted below are as a result of limitations that arose from the study and the conclusion drawn.

- The literature review and the findings from the research revealed that introducing technologies into the classroom does not automatically translate into higher academic achievement, hence future quantitative research on the impact of the use of EduTech on student's academic performance are needed to provide the overall relevance of employing technologies in higher education.
- The study did not highly present detailed moderating effects of many other relevant construct for example security, privacy and safety about using these technologies by teachers and students in educational activities. Hence, future research studies on privacy and security about various educational technologies ought to be conducted to create the awareness of such risks associated with frequent use of such technological tools in teaching and learning.
- Future research should be conducted by employing large individual case universities to provide a conclusion, which would be a true representation of findings about the use of educational technologies in Ghanaian universities.
- The study was conducted in four universities in Ghana focusing on only the business schools in the selected universities, hence the results is skewed to the ideas of business students; future research is needed to be conducted among other faculties to presents a concrete findings for the use of EduTech in higher education.

10.10 Difficulties and Challenges

Before writing this research case study, the researcher commenced with research philosophy as explained in more detailed in Chapter 5. As an interpretivist who want to gain explanations to human action by purely understanding the actual ways in which individuals understand the world, and as someone who is intrinsically motivated in studying the adoption of technologies in higher learning institutions, for example

computers and other related technologies as virtual learning communities was an intriguing proposition.

The researcher had to travel so many miles away from each university for questionnaires to be administered and interviews to be conducted. The researcher was met with reluctance from lecturers who seems to be careful by reporting any views about their departments, which could lead to their dismissal, hence declined to be interviewed.

At the time of the data collection process, Ghana is heading into its election to elect the 5^{th} president of the 4^{th} Republic of Ghana; hence most of the lecturers and heads of department at the selected universities were absent from office, perhaps for political campaign and many other reasons. This accounted for the researcher travelling more than one day before finally getting interviewees at their various offices.

In addition to a total of 396 questionnaires that were administered, the researcher also feels honoured that all twenty-five of interviewees (20 lecturers and 5 learning technologies) permitted for the interview to be conducted. All interviews were recorded, during the review of the recorded interviews. With much efforts and concentration, the researcher listened and focuses on all aspects of the participants' answers. Since the questionnaires were administered as hard copies, the researcher spent considerable number of days to inputs all the answers into SPSS for effective analysis. The researcher is greatly excited in reflecting upon the research study itself. Technologies in education are not new, but this is an age where advancement in technology is greatly improving communication methods in higher education.

11.0 References

Adam, L. (2003). Information and Communication Technologies in Higher Education in Africa: Initiatives and Challenges. Journal of Higher Education in Africa, 1, (1), 195-221.

Adesola, A. (1991). The Nigeria University: Meeting the Challenges of Growth in a Depressed Economy. Higher Education, 21, 121-133.

AETC (2008). Committee Definition and Terminology: A. Januszewski & M. Molenda (Eds.). Educational technology: A definition with commentary. New York: Lawrence Erlbaum.

Afriyie, K. (1988). A Technology Transfer Methodology for Developing Joint Production Strategies in Varying Systems, In F. J. Contractor and P. Lorange (Eds.). *Cooperative Strategies in International Business*, 81-95.

Alberta Education. (2006). One-to-One Mobile Computing: Literature Review. Retrieved from http:// education.alberta.ca/media/528965/litreview.pdf. (Accessed 23/05/2017)

Aldrich, H.E. (1979). Organizations and Environments. Englewood Cliffs, N J.: Prentice-Hall.

Altbach, & J. Salmi, (Eds.), *the Road to Academic Excellence;* Washington DC: The World Bank. (pp. 11-32).

Altbach, P. (1990). Perspectives on Comparative Higher Education: Essays on Faculty Students and Reform. Special Studies in Comparative Education, No. 22. Buffalo, New York: Comparative Education Center, SUNY.

Altbach, P. (2005). Patterns in Higher Education Development. In P. Altbach, R. Berdahl, P. Gumport (Eds.). American Higher Education in the Twenty-First Century: Social, Political, and Economic Challenges, 15-37. Baltimore: The Johns Hopkins University Press.

Amekuedee JO (2002) Information Communication Technology (ICT) for Teaching and Learning. Paper presented at Biennial Seminar of Committee of University Librarians and their Deputies (CULD) at the Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. The University Press, KNUST. 13-14,

Amekuede, J. O. (1995). Barrier to Successful University Library Automation in Ghana with Particular Reference to the Balme Library, *International Review* (27) 171-181

Apple Computer. (2005). Research: What It Says About 1 to 1 Learning. Retrieved from http:// www.ubiqcomputing.org/Apple_1-to-1_Research.pdf.

Arksey, H., & Knight, P. (1999). Interviewing for Social Scientists: An Introductory Resource with Examples. Thousand Oaks, CA: Sage.

Arrow, K. (1969). Classificatory Notes on the Production and Transmission of Technological Knowledge. *American Economic Review*, 244–250.

Association for Educational Communications and Technology (1972).The field of educational technology: a statement of definition. Audio-visual Instruction, 17(8), 36-43.

Association for Educational Communications and Technology (1977).Educational technology: Definition and glossary of terms. Washington, D.C: Association for Educational Communications and Technology.

Association for Educational Communications and Technology (2007).AECT: Code of professional ethics.

Attewell, P. (2001). The First and second digital divides. Sociology of Education, 74(3), 252-59.

Avidov-Ungar, O. (2010). "Islands of Innovation" or "Comprehensive Innovation" assimilating educational technology in teaching, learning, and management: A Case Study of school networks in Israel. Interdisciplinary Journal of E-Learning and Learning Objects, 6, 259-280.

Bakari, J.K., Tarimo, C.N., Yngstrom, L. and Magnusson, C. (2005) "State of ICT Security Management in the Institutions of Higher Learning in Developing Countries: Tanzania Case Study," Paper presented at the Fifth IEEE International Conference on Advanced Learning Technologies (ICALT'05). pp. 1007-1011.

Barajas, M., Heinemann, L., Higueras, E., Kikis-Papakadis, K., Logofatu, B., Owen, M. et al. (2004). Guidelines for Emergent Competences at Schools.

Barbour, R. S. (2001).Checklists for improving rigor in qualitative research: A case of the tail wagging the dog. British Medical Journal, 322, 1115-1117.

Barrios, T., Ambler, J., Anderson, A., Barton, P., Burnette, S., Feyten, C. (2004). Laptops for Learning. Bureau of Instruction and Innovation, Florida Department of Education, Tallahassee, FL, and Florida Center for Instructional Technology, College of Education, University of South Florida, Tampa, FL.

Bates, A. (2000). Managing Technological Change: Strategies for Academic Leaders. San Francisco: Jossey Bass.

Bates, A. (2007). Strategic Planning for E-learning in a Polytechnic. In M. Bullen & D. Janes (Eds.). Making the Transition to E-Learning: Strategies and Issues, 47-65. Hershey, PA: Information Science Publishing.

Bates, A. W. (1997) Technology, open Learning and distance education. London:

Routledge.

Bartlett, A. (2002) ICT and IMPM. In Farmers, FAO and Field Schools. Rome: FAO. Cobbinah, J.R. (2003) Enhancing strategic competitiveness in information and communication technology (ICT) Ghana Country Paper. Telematics and Informatics, 20, p.1-9.

Bazeley, P. & Jackson, K. (2013). Qualitative data analysis with NVivo (2nd Ed.). London: Sage

Bazeley, P. and Jackson, K. (2013): Qualitative Data and Analysis with Nvivo, 2nd Ed. ISBN: 978-1-4462-5655-8

Bebell, D. (2005). Technology Promoting Student Excellence: An Investigation of the First Year of 1:1 Computing in New Hampshire Middle Schools. Technology and Assessment Study Collaborative, Boston College, Chestnut Hill, MA.

Becher, T. (1987). Disciplinary Shaping of the Profession. In B.R. Clark (Ed.), The Academic Profession: National, Disciplinary, and International Settings, 271-303. Berkeley. University of California Press.

Becher, T. (1989). Academic Tribes and Territories: Intellectual Inquiry and the Cultures of Disciplines. Milton Keynes: The Society for Research into Higher Education and Open University Press.

Becher, T. & Kogan, M. (1992). Process and Structure in Higher Education (2nd Ed.). London: Routledge.

Beers, M. (2007). Using E-Learning to Promote Excellence in Polytechnic Education. In M. Bullen & D. Janes (Eds.). Making the Transition to E-Learning: Strategies and Issues, 66-83. Hershey, PA: Information Science Publishing.

Beetham, H., & Sharpe, R. (2007). An Introduction to Rethinking Pedagogy for a Digital Age. In H. In H. B. R. Sharpe (Ed.), Rethinking Pedagogy for a Digital Age: Designing and delivering e- learning. London: Routledge.

Beetham, H., McGill, L., & Littlejohn, A. (2009). Thriving in the 21st century: Learning Literacies for the Digital Age (LLiDA project). Glasgow: the Caledonian Academy, Glasgow Caledonian University.

Bennett, J., & Bennett, L. (2003). A review of factors that influence the diffusion of innovation when structuring a faculty training program. Internet and Higher Education ,6, 53-63.

Bereiter, C. (2002). Education and mind in the knowledge age. Mahwah, NJ: Lawrence Erlbaum Associates.

Belanger, Y. (2000). Laptop Computers in the K-12 Classroom. ERIC Digest. Syracuse, NY: ERIC Clearinghouse on Information and Technology. ERIC Document Reproduction Service No. ED440644.

Bergquist, W. & Pawlak, K. (2008). Engaging the Six Cultures of the Academy. San Francisco: Jossey-Bass.

Biglan, A. (1973). The Characteristics of Subject Matter in Different Academic Areas. Journal of Applied Psychology, 57, (3), 195-203.

Black, S. A., & Copsey, J. A. (2014b). Purpose, Process, Knowledge and Dignity in Interdisciplinary Projects. *Conservation Biology, 28,* 1139-1141. http://dx.doi.org/10.1111/cobi.12344

Blackman, C. & Segal, N. (1992). Industry and Higher Education. In B.R. Clark and G. Neave (Eds.).The Encyclopaedia of Higher Education, 934-946. Oxford: Pergamon.

Blaikie, N. (1993), Approaches to Social Enquiry, 1st Ed, Polity Press, and Cambridge.

Blaikie, N. (2010), Designing Social Research: the logic of anticipation, 2nd Ed, Polity Press, Cambridge.

Blattman, C. and Miguel, E. (2010), "Civil War", Journal of Economic Literature 48(1), pp. 3–57; and Harold Alderman, John Hoddinott and Bill Kinsey, "Long term consequences of early childhood malnutrition", Oxford Economic Papers, 58, 2006, pp. 450–474

Blaxter, L., Hughes, C., and Tight, M. (2007): How to research. Berkshire: Open University Press.

Blomstrom, M., & Kokko, A. (1998). Multinational Corporations and Spillovers. *Journal of Economic Surveys,* 12(3), 247-77. http://dx.doi.org/10.1111/1467-6419.00056

Blumenfeld, P., Fishman, B.J., Krajcik, J., Marx, R.W., & Soloway, E. (2000). Creating Usable Innovations in Systemic Reform: Scaling Up Technology-Embedded Project-Based Science in Urban Schools. Educational Psychologist, 35(3), 149-164.

Bogban, R. C., and Biklen, S. K. (1998): Qualitative research for education: An introduction to theory and methods. Boston: Allyn and Bacon, Inc.

Bonifaz, A., & Zucker, A. (2004). Lessons Learned About Providing Laptops for All Students. Northeast and the Islands Regional Technology in Education Consortium. Retrieved from http:// www.oberlin.k12.oh.us/onetoonedocs/LaptopLessonsRprt.pdf.

Bonoma, T.V. (1985) 'Case Research in Marketing: Opportunities, Problems, and a Process', Journal of Marketing Research XXII, May, 199-208.

Bourdieu, P. (1991): The Political Ontology of Martin Heidegger, trans. Peter Collier, Stanford, California: Stanford University Press. (In English)

Bozeman, B. (2000). Technology Transfer and Public Policy: A Review of Research and Theory. *Research Policy*, 29, 627-655. http://dx.doi.org/10.1016/S0048-7333 (99)00093-1

Brabazon, T. (2002). Digital Helmlock: Internet Education and the Poisoning of Teaching. Sydney: UNSW Press.

Bransford, J. D. 2000. How people learn: Brain, mind, experience, and school. Washington, DC: National Research Council

Brigham, L., & Joanning, H. (1999). Therapist debriefing interviews: Therapist versus ethnographer. The American Journal of Family Therapy, 27(4), 315-328

British Educational Communications and Technology Agency (BECTA). A Review of the research literature on barriers and uptake of ICT by teachers. (2004).

Bryman, A. (2007). Barriers to integrating quantitative and qualitative research. Journal of Mixed Methods Research, 1, 8-22.

Bryman, A. and Bell, E. (2011): Business Research Methods. Oxford University Press. ISBN: 978-0-19-966864-9

Buchbinder, H. (1993). The Market Oriented University and the Changing Role of Knowledge. Higher Education, 26, 331-346.

Burgelman, R. A., Maidique, M. A., & Wheelwright, S. C. (1996). Strategic Management of Technology and Innovation. (2nd Ed.). Chicago: I. L, Irwin.
Byrne, M. M. (2001). Evaluating findings of qualitative research. AORN Journal, 73, 703-704.

Cameron K.S., and Ulrich, D.O. (1986) “Transformational leadership in colleges and universities”. In J. C. Smart (Ed.), Higher education: Handbook of theory and research. New York: Agathon Press. Vol 2, pp. 1-42.

Carnoy, M. (1985). The Political Economy of Education. International Social Science Journal, 37, (2), 157-173).

Cerych, L. (1984). The Policy Perspective. In B.R. Clark (Ed.). Perspectives on Higher Education: Eight Disciplinary and Comparative Views, 233-255. Berkeley: University of California Press.

Chaika, G. (2006). Technology in the Schools: It Does Make a Difference! Education

World. Retrieved from http://www.educationworld.com/a_admin/admin/admin122.shtml. (Accessed on 12/04/2016)

Charmaz, K. (2006). Constructing grounded theory: A practical guide through qualitative analysis. Thousand Oaks, California: Sage Publishers.

Chia, R. (2002), "The Production of Management Knowledge: Philosophical Underpinnings of Research Design", in Partington, D. (ed.) Essential Skills for Management Research, 1st ed, SAGE Publications Ltd., London, pp. 1-19.

Chisnall, P. (2011). Marketing Research. New York: McGraw-Hill

Chudson, W. A (1971). The international transfer of commercial technology to developing countries. *UNITAR Research Reports* No. 13 New York.

Churchill, G. A. and Lacobucci, D. (2002): Marketing research: Methodological foundations. 8th Ed. Orlando: Harcourt College Publishers

Clark, B. (1983): The Higher Education system: Academic organization in cross-national perspective. Berkeley: University of California Press.

Clark, B. (1983). The Higher Education System: Academic organization in Cross-National Perspective. Berkeley: University of California Press.

Clark, B. (1984). Introduction. In B.R. Clark (Ed.). Perspectives on Higher Education: Eight Disciplinary and Comparative Views, 1-16. Berkeley: University of California Press.

Clark, R. E. (1994). Media will never influence learning. Educational Technology Research and Development, 42(2), 21-29.

Coffey, A., & Atkinson, P. (1996). Making sense of qualitative data: Complementary research strategies. Thousand Oaks, CA: Sage

Cohen, D., & Crabtree, B. (2006). Qualitative Research Guidelines Project. Available at: http://www.qualres.org/. . (Accessed 20 May 2017)

Coiro, J., Knobel, M., Lankshear, C., & Leu, D. (2008). Handbook of research on new literacies. New York: Laurence Erlbaum.

Coiro, J., Knobel, M., Lankshear, C., & Leu, D. (2008). Handbook of research on new literacies. New York: Laurence Erlbaum.

Cole, R. (Ed.). (2000). Issues in Web-Based-Pedagogy: A Critical Primer. Westport, CT: Greenwood.

Collier, P. (2009): Wars, guns and votes, Harper Collins; and World Bank, World Development Report 2011: Conflict, Security, and Development

Collis, J. and Hussey, R. (2014): Business Research: a practical guide for undergraduate and postgraduate students. (3rd Ed.). New York: Palgrave McMillan. ISBN: 978-0-230-30183-2

Cooley, N. (2001). Instructional Technology and Improving Student Achievement. The Informed Educator Series. Arlington, VA: Educational Research Service.

Cope, B., & Kalantzis, M. (2000). Introduction: Multiliteracies. In B. Cope & M. Kalantzis (Eds.), Multiliteracies: Literacy learning and the design of social futures. London: Routledge.

Corbetta, P. 2003. 'The qualitative interview', in Social Research. Theory, Method and Techniques, Sage Publications, ch, 10; 264-286

Cradler, J. (1996). Implementing Technology in Education: Recent Findings from Research and Evaluation Studies. Policy Brief. Far West Laboratory for the California Department of Education, San Francisco, CA.

Creswell, J. W. (2007). Qualitative inquiry and research design: Choosing among five traditions (2nd Ed.) Thousand Oaks, CA: Sage

Creswell, J. W. (2014). Research Design: Qualitative, Quantitative and Mixed Methods Approaches (4th Ed.). Thousand Oaks, CA: Sage.

Creswell, J.W. & Tashakkori, A. (2007). Editorial: Developing Publishable Mixed Methods Manuscripts. Journal of Mixed Methods Research, 1(2), 107-111

Crotty, M. (1998): The foundations of social research: the meaning and perspective in the process. London: Sage Publishers.

Cuban, L. (1993): How teachers taught: Constancy and change in American classrooms, 1880-1990 (2nd Ed.). New York: Teachers College Press, pg. 359

Cuban, L. (1993). How teachers taught: Constancy and change in American classrooms 1880-1990. New York: Teachers College, Columbia University.

Cuban, L. (2001) Why are most teachers infrequent and restrained users of computers in their classrooms? In J. Woodward and L. Cuban (Eds) Technology, Curriculum and Professional Development: Adapting Schools to Meet the Needs of Students with Disabilities. Thousand Oaks, CA: Corwin Press

Culp, K.M., Honey, M., & Mandinach, E. (2003). A Retrospective on Twenty Years of Education Technology Policy. Office of Educational Technology, U.S. Department of Education. Retrieved from http:// ed.gov/rschstat/eval/tech/20years.pdf. (Accessed on 16/08/20/16)

Curran, J. (1999): The role of the small firm in the UK economy: hot stereotypes and Cool Assessments, *Small Business Research Trust Report* (Small Business Research Trust, Milton Keynes).

Dabbagh, N. & Bannan-Ritland, B. (2005). Online Learning: Concepts, Strategies and Application. NJ: Prentice-Hall.

Daniel, J. (1997). Why Universities Need Technology Strategies. Change, July/August, 11-17.

Dede, C. (1996). Emerging technologies and distributed learning. American Journal of Distance Education, 10(2), 4-36.

Denison, E. (1962). The Sources of Economic Growth in the United States and the Alternatives before Us. New York: Committee for Economic Development.

Denzin, N. and Lincoln, Y. (2003): The discipline and practice of qualitative research: Collecting and interpreting qualitative materials, 2nd Ed. Sage Publication, Inc., California, Development, and Vol.16 (Issue 3), pp. 191-211. Doi: 10.1080/02681102.2010.497273.

De Vos, A.S. 2005. Scientific theory and professional research. In De Vos A.S., Strydom, H., Fouché C.B. & Delport C.S.L. Research at the grass roots for the social sciences and human service professions. 3rd ed. Pretoria: JL Van Schaik Publishers

Dexter, S., Anderson, R., & Ronnkvist. A. (2002). Quality Technology Support: What Is It? Who Has It? And What Difference Does It Make? Journal of Educational Computing Research, 26(3), 265-285.

Drent M. & Meelissen M. (2008) which factors obstruct or stimulate teacher educators to use ICT innovatively? Computers and Education 51, 187–199

Donovan, L., Hartley, K., & Strudler, N. (2007). Teacher Concerns during Initial Implementation of a One- to-One Laptop Initiative at the Middle School Level. Journal of Research on Technology in Education, 39(3), 263-286.

Doran, C. (2014): Ethical codes of conduct: Theory and application in Small and Medium Business. PhD Thesis, University of Salford, UK

Dore, R. P. (1976). The Diploma Disease: Education, Qualification and Development. London: George Allen & Unwin.

Doyle, S. (2007). Member checking with older women: A framework for negotiating meaning. Healthcare for Women International, 28, 888-908.

Driscoll, Marcy. (2000). Psychology of Learning for Instruction. Boston: Allyn& Bacon

Dunleavy, M., Dexter, S., & Heinecke, W.F. (2007). What Added Values Does a 1:1 Student to Laptop Ratio Bring to Technology-Supported Teaching and Learning? Journal of Computer Assisted Learning, 1(1). Retrieved from http://pkp.sfu.ca/ojs/demo/present/index.php/jce/article/view/171/56

Dwyer, D.C., Ringstaff, C and Sandholtz, J. H (1997) Teacher beliefs and practices part II: support for change: the evaluation of teachers' instructional beliefs and practices in high access to technology classrooms, first – fourth year findings, Cupertino, CA: Apple Computer.

Easterby-Smith, M., Thorpe, R. and Jackson, P. R. (2015): Management and Business Research, 5th Ed., Sage Publication Ltd., London.

Educational Research Service. (2002). Focus on Technology in Education. Arlington, VA.

Ehrmann, S. (1995) "New technology, old trap", Education review, Vol. 30, No. 5, pp. 41-43.

Eichelberger, R. T. (1989): Discipline inquiry: Understanding and doing educational research. New York: Longman

Eisenhardt, K.M. (1989), 'Building theories from case study research', Academy of Management Review, Vol. 14, No. 4, pp. 532-550.

Entwistle, N., & McCune, V., Ramsden, P (2011). The conceptual bases of study strategy inventories. Educational Psychology Review, 4, 325–346

Ely, D.P. (1963). The changing role of the audio-visual process in education: A definition and a glossary of related terms. TCP Monograph No. 1. AV Communication Review, 11(1). Evolutionary Nature of the Definition of Educational Technology

Ely, D.P. (1973). Defining the field of educational technology. Audio-visual Instruction, 8(3), 52-53.

Ely, D.P. (1973). Defining the field of educational technology. Audio-visual Instruction, 8(3), 52-53.

Epper, R. M. & Bates, A. (Eds.). (2001). Teaching Faculty How to Use Technology: Best Practices From Leading Institutions. Westport CT.: American Council on Education/Oryx Press.

Eriksson, P. &Kovalainen, (2008), Qualitative Methods in Business Research, (1st Ed.) SAGA Publications Ltd., London, p. 14-20

Eriksson, P. and Kovalainen, A. (2008), Qualitative Methods in Business Research, 1st ed, SAGE Publications Ltd., London.

Farrel, G. M. (1999) "The development of virtual education: A global perspective", A study of current trends in the virtual delivery of education, Vancouver

Fesenko, A. (2011). Kyrgyz Republic ICT Country Study. In. ADB. (2012). ICT in Education in Central and West Asia. Manila: Asian Development Bank (ADB).

Flick, L., and Bell, R. (2000): Preparing tomorrow's science teachers to use technology: Guidelines for science educators. Contemporary Issues in Technology and Teacher Education [Online serial] 1 (1): 39-60

Flowers, P. (2009): Research Philosophies- Importance and relevance: Leading learning, and Change, Cranfield School of management. Issue 1

Fouts, J.T. (2000). Research on Computers and Education: Past, Present, and Future. Retrieved from http://www.portical.org/fouts.pdf.

Fugluu, G.N (2009) The Introduction of ICT into the Ghanaian Educational Curriculum; successes, failures and the way forward. Northern ICT4D Series

Freeman, J. (2002). The Total Cost of Technology. School Business Affairs, 68(9), 23-26.

Gahala, J. (2001). Promoting Technology Use in Schools. North Central Regional Educational Laboratory Critical Issue. Retrieved from http://www.ncrel.org/sdrs/areas/issues/methods/technlgy/te200.htm. (Accessed 24/08/2016)

Galbraith, J. K. (1972). The New Industrial State. London, UK: Andre Deutsch.

Gill, P. Burnard, P. (2012) Time to end the vagaries of PhD examining? Nurse Education Today, 32, 477- 478.

Gill, J and Johnson, P (2010) Research Methods for Managers (4th Edition). London: Sage Publications Ltd.

Gillen, J., & Barton, D. (2010). Digital Literacies. TLRP.

Glasser, B and Strauss, A. (2006): The discovery of grounded theory: Strategies for qualitative research. AldineTransaction. ISBN: 0-202-30260-1

Good, T. and Brophy, J. (1994) Looking in classrooms (6th Ed). New York: Harper Collins

Goulet, D. (1989). The Uncertain Promise: Value Conflicts in Technology Transfer. New York: New Horizons Press.

Greene, J., & Caracelli, V. (2002). Making paradigmatic sense of mixed methods practice. In A. Tashakkori & C. Teddlie (Eds.). Handbook of mixed methods in social and behavioral research (pp. 91-111). London: SAGE

Guba, G. (1990). *The paradigm dialog.* London: Sage Publishers.

Guba, G., & Lincoln, Y, S. (1998). Competing paradigms in qualitative research. In N. K. Denzin and Y Lincoln (Eds.). Handbook of qualitative research. Thousand Oaks, CA: Sage.

Gulek, J.C., & Demirtas, H. (2005). Learning with Technology: The Impact of Laptop Use on Student Achievement. ERS Spectrum, fall 2005, 4-20.

Hammersly, M. (2013). What is Qualitative Research? What Is? Research Methods. London: Continuum/Bloomsbury.

Hannan, M. T. & Freeman, J. H. (1977). The Population Ecology of Organizations. American Journal of Sociology, 82, 929-964.

Hargittai, E., Fullerton, L., Muenchen-Trevino, E., & Yates Thomas, K. (2010). Trust Online: Young Adults' Evaluation of Web Content°. International Journal of Communication, 4, 468-494.

Hart, C. (2014): Doing a literature review; releasing the social sciences research imagination; Sage study skills, the Open University. 6th Ed. ISBN: 9780761959748

Hargittai, E., Fullerton, L., Muenchen-Trevino, E., & Yates Thomas, K. (2010). Trust Online: Young Adults' Evaluation of Web Content°. International Journal of Communication, 4, 468-494.

Harron, A M. (2009). The Introduction of ICT into the Ghanaian Educational Curriculum; successes, failures and the way forward. Northern ICT4D Series

Hatch, M., J. and Cunliffe, A. L. (2006): Organizational Theory, 2nd Ed, Oxford University Press, and Oxford.

Hawkins, R., & T. Gladwin. (1981). Conflicts in the international transfer of technology: a US home country view.

Hawthorne, E. P. (1971). The Transfer of Technology. Paris: OEDC.

Haydn, T. A and Barton, R. (2007): Common needs and different agendas: How trainee teachers make progress in their ability to ICT use in subject teaching. Some lessons from the UK. Computers and Education, 49 (4): 1018-1036.

Healey, D. (2001). Are Technology-Using Students Better Learners? Presentation at the Teacher to Teacher Conference, Abu Dhabi, United Arab Emirates, 2001. Retrieved from http://www.oregonstate.edu/ ~healeyd/t2t.html.

Hearrington, D., & Strudler, N. (2006). Factors That Impact the Instructional and Technical Support Provided by Site-Based Technology Coordinators in K-12 Schools. Paper presented at the National Educational Computing Conference, San Diego, CA, and July 2006.

Hiatt, J. F. (1986). Spirituality, medicine, and healing. Southern Medical Journal, 79, 736–743.

Hilbert, M. (2012). "Digital gender divides or technologically empowered women in developing countries? A typical case of lies, damned lies, and statistics". Women's Studies International Forum, 34(6), 479-489.

Hoepfl, M. C. (1997). Choosing qualitative research: A primer for technology education researchers. Journal of Technology Education, 9(1).

Honey, M., Culp, K.M., & Spielvogel, R. (2005). Using Technology to Improve Student Achievement. North Central Regional Educational Laboratory Critical Issue.

Hopey, C., & Knuth, R. (1996). Guiding Questions for Technology Planning. North Central Regional Technology in Education Consortium. Retrieved from http://www.ncrtec.org/capacity/guidewww/ gqhome.htm. (Accessed on 14/06/2016)

Hughes, C. 2006. Quantitative and qualitative approaches [online]. Available at: http://www2.warwick.ac.uk/fac/soc/sociology/staff/academicstaff/chughes/hughesc_index/teaching researchprocess/quantitativequalitative/quantitativequalitative/ (Accessed 27 May 2017)

Inge, K., Isabelle, G., and Marc, S. (1999): Global Public Goods, International cooperation in the 21st century. New York: Oxford University Press.

Ivers, K. S. (2002): Changing teacher's perceptions and the use of technology in the classroom. Paper presented at the American Education Research Association, New Orleans, and L.A.

Jackson, L. (2004). One-To-One Computing: Lessons Learned and Pitfalls to Avoid. Education World. Retrieved from http://www.education-world.com/a_tech/tech/tech197.shtml. (Accessed on 10/09/2017)

Jackson, L. (2004). One-To-One Computing: Lessons Learned and Pitfalls to Avoid. Education World. Retrieved from http://www.education-world.com/a_tech/tech/tech197.shtml.

James, K. and Vinnicombe, S. (2002): Acknowledging the individual in the Researcher: In Partington, D, D. (Ed.) Essential skills for management research, 1st Ed, Sage Publication Ltd. London. pp. 84-94

Johnson, P., & Clark, M. (2006). Editor's introduction: mapping the terrain: an overview of business and management research methodologies. In P. Johnson & M. Clark (Eds.). *Business and Management Research Methodologies*. London: Sage, pp. xxv-lv.

Johnston, M. (2000). Using Technology to Enhance New Models of Teaching and Learning. The Informed Educator Series. Arlington, VA: Educational Research Service.

Jonassen, D. (2000). Towards a design theory of problem solving. Education Technology: Research and Development, 48(4), 63-84.

Jonassen, D. (1991). Objectivism vs constructivism: Do we need a new philosophical paradigm? Educational Technology, Research and Development, 39(3), 5-13.

Jones, R. (1970). The Technology Factors in International Trade. New York: Universities Bureau of Economics Research.

Joppe, M. (2000). The Research Process. Available at: http://www.ryerson.ca/~mjoppe/rp.htm. (Accessed 14 May 2017)

Kagioglou, M., Cooper, R., Aoud, G., Hinks, J., Sexton, M., G and Sheath, D. M. (1998): A Generic Guide to the Design and Construction Process Protocol, University of Salford: Salford.

Karchmer-Klein, R. (2007). Re-examining the practicum placement: How to leverage technology to prepare preservice teachers for the demands of the 21st century. Journal of Computing in Teacher Education, 23(4), 121-129.

Katz, D. & Khan, R. (1966). The Social Psychology of Organizations. New York: Wiley.

Kelly, O. (2007). Moving to Blended Delivery in a Polytechnic: Shifting the Mindset of Faculty and Institutions. In M. Bullen & D. Janes (Eds.). Making the Transition to E-Learning: Strategies and Issues, 33-46. Hershey, PA: Information Science Publishing.

Kerlinger, F. N., & Lee, H. B. (2000). Foundations of behavioral research (4th Ed.). Holt, NY: Harcourt College Publishers.

Kozma, R. (1991). Learning with media. Review of Educational Research, 61, 179-221.

Kozma, R. (1994). Will media influence learning: Reframing the debate? Educational Technology Research and Development, 42(2), 7-19.

Kozma, R. (2003) (Ed.). Technology, Innovation, and Educational Change: A Global Perspective. Eugene: International Society for Technology in Education.

Kozma, R.B. (2008). Comparative analysis of policies for ICT in Education. Springer International Handbooks of Education, 20, 1083-1096, DOI: 10.1007/978-0-387-73315-9_68

Kuh, G. & Whitt, E. (1988). The Invisible Tapestry: Culture in American Colleges and Universities. Washington, DC: Association for the Study of Higher Education.

Kuhn, S. T. (1962): The structure of scientific revolutions, Volumes I and II, foundations of unity of science, Number 2.

Kuhn, T. S. (1977). The essential tension: Selected studies in tradition and change. Chicago: Chicago University Press.

Kumar, V., Kumar, U., & Persaud, A. (1999). Building Technological Capability through Importing Technology: The Case of Indonesian Manufacturing Industry. *Journal of Technology Transfer*, 24, 81-96. http://dx.doi.org/10.1023/A:1007728921126

Kvale, S. (1996), Interviews, 1st Ed, Sage Publications, Inc., London.

Lan, P., & Young, S. (1996). International Technology Transfer Examined at Technology Component Level: A Case Study in China. *Technovation,* 16 (6), 277-286. http://dx.doi.org/10.1016/0166-4972 (96)00005-3

Landow, G. P. (2006). Hypertext 3.0: Critical Theory and New Media in an Era of Globalisation. Baltimore, Maryland: The Johns Hopkins University Press

Laurillard, D. (2012)Teaching as a Design Science: Building Pedagogical Patterns for Learning and Technology., Routledge, Taylor & Francis Group, 7625 Empire Drive, Florence, KY 41042

Lawrence, P. R. & Lorsch, J. W. (1967). Organization and Environment: Managing Differentiation and Integration. Homewood, Ill.: Irwin.

Layder, D. (1993). New Strategies in Social Research: An Introduction and Guide. Cambridge: Polity.

Levin, M. (1993). Technology Transfer as a Learning and Development Process: An Analysis of Norwegian Programmes on Technology Transfer. *Technovation*, 13 (8), 497-518. http://dx.doi.org/10.1016/0166-4972 (93)90065-4

Levy, F., and R. Murnane. (2013). dancing with robots: Human skills for computerized work. NEXT Report. http://www.thirdway.org/publications/714 accessed: 9/26/2017.

Lewis, T., Marginson, S. & Snyder, I. (2005). The Networked University? Technology, Culture and Organisational Complexity in Contemporary Higher Education. Higher Education Quarterly, 59(1), 56-75.

Lin, W. B. (2003). Technology Transfer as Technological Learning: A Source of Competitive Advantage for Firms with limited R & D Resources. *R & D Management*, 33 (3), 327-341. http://dx.doi.org/10.1111/1467-9310.00301.

Lincoln, Y., & Guba, E. (1985) Naturalistic inquiry. Newbury Park, CA: Sage Publications.

Lindlof. T.R. (2001). The Challenge of Writing the Qualitative Study. In W. P. Potter & A. Alexander (Eds.), Editor's Guide to Scholarly Publishing. Thousand Oaks, CA: Sage Publications.

Lockwood, M. (1995) what's happening to Knowledge about Language in the Primary Years? In: B. Raban-Bisby, G. Brooks & S.Wolfendale (Eds) Developing Language and Literacy (Stoke on-Trent: Trentham Books), 69-79.

Lockwood, M. (1998) Practical Ways to Teach Standard English and Language Study (University of Reading: Reading and Language Information Centre).

Lovell, S. A. (1998). Technology Transfer: Testing a Theoretical Model of the Human, Machine, Mission, Management and Medium Components. Unpublished MSc. thesis. Cranfield: College of Aeronautics, Cranfield University.

Lynch, K. and Lodge, A. (2002) Equality and Power in Schools: Redistribution, Recognition and Representation. London: RoutledgeFalmer.

Mackay, H. (1991). Technology as an Educational Issue: Social and Political Perspectives. In H, Mackay, M. Young & B. John (Eds.). Understanding Technology in Education, 1-12, New York: The Falmer Press.

MacKenzie, D., & Wajcman, J. (1985). The Social Shaping of Technology: How the Refrigerator Got Its Hum, Milton Keynes: Open University Press.

Madeuf, B. (1984). International technology transfers and international technology payments: definitions, measurements and firms' behaviour. *Research Policy,* 13(3).

Marshall, J.M. (2002). Learning with Technology. White Paper prepared for Cable in the Classroom. Retrieved from http://www.medialit.org/reading_room/pdf/545_CICReportLearningwithTechnology.pdf.

Martin, W. (1988). The Information Society. London: Aslib.

Mascus, K. E. (2003). Encouraging International Technology Transfer. UNCTAD/ICTSD Capacity Building Project. On Intellectual Property Rights and Sustainable Development.

Massey, W. & Zemsky, R. (1995). Using Information Technology to Enhance Academic Productivity. Washington, D.C.: Edcom.

McLuhan, M. (1964) Understanding Media: The Extensions of Man. New York: McGraw Hill.

Means, B. (2000). Technology Use in Tomorrow's Schools. Educational Leadership, 58(4), 57-61.

Merrill, R. (1968). The Role of Technology in Cultural Evolution. Social Biology, 19 (3), 246–256.

Methe, D.T. (1991). Technology Competition in Global Industries. New York: Quarum Books.

Mereku, D. K., Yidana, I, Hordzi, W., Tete-Mensah, I., Tete-Mensah, W., and Williams, J. B. (2009), "Ghana Report". University of Education, Winneba, Ghana.

Meyer, J. W. & Scott, R. S. (1992). Organizational Environments: Ritual and Rationality. Newbury Park: Sage.

Michael S. & Holdaway, E. (1992). Entrepreneurial Activities in Postsecondary Education. The Canadian Journal of Higher Education, 22, (2), 15-40.

Microsoft. (2000). Research Finds Laptop Learning Yields Better Students and Better Teachers Through Anytime, Anywhere Access. Retrieved from http://www.microsoft.com/presspass/press/2000/ sept00/LaptopPR.mspx.

Miles, M., & Huberman, A. (1994). An expanded sourcebook: qualitative data analysis (2nd Ed.). London: Sage Publishers.

Miles, R. (1980). Macro Organizational Behaviour. Glenview, Ill.: Scott, Foresman & Company.

Mintzberg, H. (2009). Rebuilding Companies as Communities. *Harvard Business Review, 87,* 140-143

Morgan, D. L. (2007). Paradigms lost and pragmatism regained. Journal of Mixed Methods Research, 1, 48-76.

Morse, J. M., Barrett, M., Mayan, M., Olson, K., & Spiers, J. (2002). Verification strategies for establishing reliability and validity in qualitative research. International Journal of Qualitative Methods, 1(2), 1-19.

Mounce, H. O. (1997). The two pragmatisms: From Peirce to Rorty. London: Routledge.

Moursund, D. and Bielefeldt, T. (1999). Will new teachers be prepared to teach in a digital age? Eugene, Ore.: International Society for Technology in Education and the Milken Exchange on Education Technology. www.mff.org/publications/publications.taf?page=154. Accessed Jan, 2017

Moustakas, C. (1994). Phenomenological research methods. Thousand Oaks, CA: Sage.

Mullis, Ina V.S., Michael O. Martin, Pierre Foy and Alka Arora (2012). TIMSS 2011 International results in mathematics. Boston, MA: TIMSS and PIRLS International Study Center/ Lynch School of Education, Boston College

Mumtaz. S. (2000): Factors affecting teachers‟ use of information and communication technology: a review of the literature, Technology, Pedagogy and Education. Journal of Information Technology for Teacher Education, 9 (3): 319-342

Nandre, D., & Girasse, S. (2013). Innovation of Computer Technology and its Impact for the Classroom Management. Journal of Research in Management and Technology, pp. 37-38.

Natarajan, & Tan, J. M. (1992). The Impact of MNC Investments in Malaysia, Singapore and Thailand. Singapore: Institute of Southeast Asian Studies.

National Center for Education Statistics. (2003). Technology in Schools. Washington, DC: National Forum on Education Statistics, U.S. Department of Education.

National Accreditation Board (2018): List of universities in Ghana. Available at: http://www.nab.gov.gh/news1/414-accredited-published-tertiary-institutions-as-at-august-2016-summary. Accessed on 8/04/2018.

National Committee for WSIS Prepcom II (2003) “Tanzania country paper as input to the 2nd world summit on the information society preparatory committee (WSIS Prepcom II)”.

Neave, G. & Vught, F.A.V. (1994). Government and Higher Education in Developing Nations: A Conceptual Framework. In G. Neave and F.A.V. (Eds.).Government and Higher Education Relationships Across three Continents: The Wind of Change, 1-21. New York: Pergamon.

Neuman, W. L. (2003): Social Research Methods: Qualitative and Quantitative approaches (4th Ed.). Boston, MA: Allyn and Bacon.

Nkansah, G. B., & Unwin, T. (2010). The Contribution of ICTs to the Delivery of Special Education Needs in Ghana: Practices and Potential. Information Technology for

Noble, D. (1998). Digital Diploma Mills: The Automation of Higher Education. Monthly Review, 49, 38-52.

Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation. *Organization Science*, 5, 14–37. http://dx.doi.org/10.1287/orsc.5.1.14

November, A., Staudt, C., Costello, M.A., & Huske, L. (1998). Developing a School or District Technology Plan. North Central Regional Educational Laboratory Critical Issue

O'Bannon, B., & Judge, S. (2004). Implementing Partnerships across the Curriculum with Technology. Journal of Research on Technology in Education, 37(2), 197-216.

Oates, J. B. (2006): Researching Information systems and computing, sage publishing Ltd. ISBN: 978-1-4129-0223-1

OECD (2015). Students, computers, and learning: Making the connection. Paris, France: OECD Publishing. Doi: 10.1787/9789264239555-en

Oliver, P. (2010): Student's Guide to Research Ethics (2nd Edition). : Open University Press. http://site.ebrary.com/id/10403994?ppg=84

Oliver, K.M. (2000). Methods for developing constructivism learning on the web," Educational Technology, 40 (6)

Oppenheimer, T. (1997). The Computer Delusion. The Atlantic Monthly, July 1997. Retrieved from http:// www.theatlantic.com/issues/97jul/computer.htm.

Pacey, A. (1983). The Culture of Technology. Oxford: Blackwell.

Parry, K. & Boyle, M. (2009). Organizational auto ethnography. In D. A. Buchanan and A. Bryman (Eds.), The SAGE handbook of organizational research methods (pp. 690-702). London, UK: SAGE Publications Ltd. ISBN: 978-1-4129-3118-2.

Patton, M. Q. (2000), Qualitative Evaluation and Research Methods, 2nd edition, Sage: Newbury Park.

Pavitt, K. (1985). Patent Statistics as Indicators of Innovative Activities: Possibilities and Problems. *Scientometrics*, 7, 77–99. http://dx.doi.org/10.1007/BF02020142

Pedro, F. (2012). Trusting the unknown: The effects of technology use in education. In D. Soumitra and B. Bilbao-Osorio (Eds.). The Global Information Technology Report 2012: Living in a Hyper connected World. Geneva: World Economic Forum and INSEAD.

Petre, M & Rugg, G. (2010) *The Unwritten Rules of PhD Research Open Up Study Skills*. (Berkshire: Open University Press), 14

Pelgrum, W.J and Anderson, R.E (1999) "ICT and the emerging paradigm for lifelong learning: a worldwide educational assessment of infrastructure, goals and practice", International Association for the Evaluation of Educational Achievement and University Twente.

Penuel, W.R. (2006). Implementation and Effects of One-to-One Computing Initiatives: A Research Synthesis. Journal of Research on Technology in Education, 38(3), 329-348.

Peterson, R. A. (2000): Constructing effective questionnaire. Available at: http://www.thebookishblog.com/constructing-effective-questionnaires.pdf. (Accessed 14 May 2017)

Polanyi, M. (1967). *The Tacit Dimension*. NY: Anchor, Garden City.

Poole, B.J. (2008). Ten Pillars of Successful Technology Implementation. Education World. Retrieved from http://www.education-world.com/a_tech/tech/tech188.shtml. (Accessed on 10/09/2017)

Postman, N. (1992). Technology: The Surrender of Culture to Technology. New York: Alfred A. Knopf.

Pourtashi, M., & Rezvanfar, A. (2010). Analysis of Factors Influencing Application of ICT by Agricultural Graduate Students. Journal of the American Society for Information Science and Technology, pp. 81- 87. Doi: 10.1002/asi.21230.

Price, J. H. and Judy Murnan, Judy (2004) "Research Limitations and the Necessity of Reporting Them." American Journal of Health Education 35: 66-67.

Price, S. & Oliver, M. (2007). A Framework for Conceptualizing the Impact of Technology on Teaching and Learning. Educational Technology & Society, 10 (1), 16-27.

Promote Healthy ICT Use Among their Students? P.G. 869-875. Doi: 10.3233/WOR-

Promote Healthy ICT Use Among their Students? pg. 869-875. Doi: 10.3233/WOR-

Protheroe, N. (2005). Technology and Student Achievement. Principal, 85(2), 46-48. Publications: Thousand Oaks.

Punch, K (2008) Introduction to Social Research: Quantitative and Qualitative Approaches, London, Sage

Punch, K. (1998): Introduction to social research quantitative and qualitative approaches (2nd Ed.). London: Sage Publishers.

Rager, K. B. (2005). Self-care and the qualitative researcher: when collecting data can break your heart. Educational Researcher, 34(4), 23-27.

RAND Critical Technologies Institute. (1995).The Costs and Effectiveness of Educational Technology. Proceedings of a Workshop on Critical Issues, November 1995. U.S. Department of Education. Retrieved from http://www.ed.gov/about/offices/list/os/technology/plan/rand/costs/costs.html. (Accessed on 18/08/2016)

Ransom, W., Graham, C. & Mott, J. (2007). Faculty Perceptions of Technology Projects. Educause Quarterly, 4, 22-28.

Razavi, M. N., & Iverson, L. (2006). A grounded theory of information sharing behaviour in a personal learning space. Proceedings from 20th anniversary conference on Computer supported cooperative work, Banff, Alberta, Canada.

Reddy, N. M., & Zhao, L. (1990). International Technology Transfer: A Review. *Research Policy*, 19, 285-307. http://dx.doi.org/10.1016/0048-7333 (90)90015-X

Reiser, R. A. & Dempsey, J. V. (2012).Trends and issues in instructional design and technology. Upper Saddle River, NJ: Prentice Hall.

Reisman, A. (2006). Transfer of Technologies: A Cross-disciplinary Taxonomy. The International Journal of Management Science, 33, 189-202.

Reigeluth CM, Watson R, Watson SL, Dutta P, Chen Z and Powell N (2008). Roles for technology in the information-age paradigm of education. Educational Technology, 48: 6, 32 - 39.

Remenyi, D., Williams, B., M., Arthur and Swartz, E. (1998), Doing Research in Business and Management. An Introduction to Process and Method, London: Sage.

Resier, R. A. (2001). A history of instructional design and technology: Part II: A history of instructional design. ETR&D, 49(2), 41-57.

Reddy, N.; Zhao, L. (1990); “International technology transfer: A review”; Research Policy 10: 285 – 307

Ricoeur, P. (1977): "Writing as a Problem for Literary Criticism and Philosophical Hermeneutics," Philosophic Exchange: Vol. 8: No. 1, Article 1. Available at: http://digitalcommons.brockport.edu/phil_ex/vol8/iss1/1

Robock, S. H. (1980). *The International Technology Transfer Process*. Washington D.C: National Academy of Sciences.

Rodriguez, G., & Knuth, R. (2000). Providing Professional Development for Effective Technology Use. North Central Regional Educational Laboratory Critical Issue. Retrieved from http://www.ncrel.org/ sdrs/areas/issues/methods/technlgy/te1000.htm.

Rogers, E. M., & Shoemaker, F. F. (1971). *Communication of Innovations. A Cross Cultural Approach*. New York: Free Press.

Rogers, E.M. (2003). Diffusion of innovations (5th ed.). New York: Free Press.

Rosenberg, N., & Frischtak. C. (1985). *International Technology Transfer: Concepts, Measures and Comparisons.* New York: Praeger.

Rugg, G & Petre, M. (2010): The unwritten rules of PhD Research- Open up study skills, Second Edition, McGraw Hill, ISBN-13: 978-0-33-523702-9 (PB)

Sahal, D. (1981). Alternative Conceptions of Technology. *Research Policy,* 10, 2-24. http://dx.doi.org/10.1016/0048-7333 (81)90008-1

Saettler, P. (1990). The evolution of American educational technology. Englewood, CO: Libraries Unlimited

Sarfo, F. K. & Ansong-Gyimah, K. (2010): The perceptions of students, teachers, and educational officers in Ghana on the role of computer and the teacher in promoting the five principles of instruction. The Turkish Online Journal of Educational Technology – July 2010, volume 9 Issue 3

Saunders, M., Lewis, P., and Thornhill, A. (2012): Research methods for Business students. Pearson Education Ltd. ISBN: 978-0-273-75075-8

Sazali, A.W., & Raduan, C. R. (2011). The Inter-Firm Technology Transfer in Malaysia – A Holistic Approach. Saarbrucken: VDM Verlag Publishing.

Schultz, T. (1961). Investment in Human Capital. American Economic Review, 51, (1), 1-17.

Schwandt, T. A. (2001): Dictionary of qualitative inquiry (2nd Ed.). Thousand Oaks: Sage.

Seels, B. B., & Richey, R. C. (1994).Instructional technology: The definition and domains of the field. Washington, DC: Association for Educational Communications and Technology.

Selwyn, N. (2014): Education and Technology; Key issues and Debates, Bloomsbury. London. ISBN: 978-1-4411-1182-1.

Shewhart, W. (1931). *Economic Control of Quality of Manufactured Product*. New York: Van Nostrand Company.

Sivin-Kachala, J., & Bialo, E.R. (2000). 2000 Research Report on the Effectiveness of Technology in Schools. Washington, DC: Software Information Industry Association

Slife, B. D., & Richardson, F. C. (2008). Problematic ontological underpinnings of positive psychology: A strong relational alternative. Theory & Psychology, 18(5), 699-723.

Smith, A. K., Ayanian, J. Z., Covinsky, K. E., Landon, B. E., McCarthy, E. P., Wee, C. C., & Steinman, M. A. (2011). Conducting high-value secondary dataset analysis: An introductory guide and resources. Journal of General Internal Medicine, 28(8), 920- 929. Doi: 10.1007/s11606-010-1621-5

Special Education Needs in Ghana: Practices and Potential. Information Technology for

Stern, N. (2007).The Economics of Climate Change: The Stern Review. Cambridge University Press, Cambridge

Stiglitz, J. A., Amartya, S. and Jean-Paul, F. (2010), Report by the Commission on the Measurement of Economic Performance and Social Progress (www.stiglitz-sen-fitoussi.fr)

Strassman, W. P. (1968). Technological Change and Economic Development: The Manufacturing Process of Mexico and Puerto Rico. Ithaca: Cornell University Press.

Stratham, D.S., & Torell, C.R. (1999). Computers in the Classroom: The Impact of Technology on Student Learning. Spotlight on Student Success, No. 206.

Stratham, D.S., & Torell, C.R. (1999). Computers in the Classroom: The Impact of Technology on Student Learning. Spotlight on Student Success, No. 206.

Strauss, A., & Corbin, J. (1990). Basics of qualitative research: Grounded theory procedures and techniques. Newbury Park, CA: Sage

Tammets, K., Tammets, P., & Laanpere, M. (2008). Introducing Open Classroom 2.0 to Teachers through Immersive Learning. http://www.edenonline.org/contents/conferences/OCRCs/.../KT_PT_ML.pdf

Tashakkori, A., & Teddlie, C. (1998). Mixed methodology: Combining qualitative and quantitative approaches. Thousand Oaks, CA: SAGE
Teddlie, C., & Tashakkori, A. (2009). Foundations of mixed methods research. Thousand Oaks, CA: SAGE.

Teese, D. (1976). The Multinational and the Resource Cost of International Technology Transfer. Ballinger: Cambridge, MA.

Teichler, U. (1991). The Federal Republic of Germany. In G. Neave and F. A. V. Vught (Eds.).Prometheus Bound: The Changing Relationship between Government and Higher Education in Western Europe, 29-49, New York: Pergamon.

Tepstra, V., & David, K. (1985). *The Cultural Environment of International Business*, Cincinnati,, OH: Southwestern Publishing Co.

Thietart, R. A. (2001): Doing Management Research: A comprehensive Guide, Sage, London, 1st Ed. ISBN-0761-965-165

Tihanyi, L., & Roath, A. S. (2002). Technology Transfer and Institutional Development in Central and Eastern Europe. Journal of World Business, 37, 188-198. http://dx.doi.org/10.1016/S1090-9516(02)00077-9

Tremblay, K., Lalancette, D., & Roseveare, D. (2012): Assessment of Higher Education Learning Outcomes (AHELO), Feasibility study report, Vol. 1, OECD: Better policies for better lives.

Trochim, W. M. K., & Land, D. A. (1982). Designing designs for research. The Researcher, 1, 1–6.

Tusubira, F. & Mulira, N. (2004) "Integration of ICT in organizations: Challenges and best practice recommendations based on the experience of Makerere University and other organizations", Paper presented at the International ICT Conference Held at Hotel Africana, Kampala, Uganda.

Twidle, J., Sorensen, P., Childs, A., Godwin, J., & Dussart, M. (2006). Issues, challenges and needs of student science teachers in using the Internet as a tool for teaching. Technology, Pedagogy and Education, 15(2), 207-221.

UNDP. (2007) Human Development Report 2007/2008, Fighting Climate Change: Human Solidarity in a Divided World. UNDP, New York.

Valdez, G. (2005). Technology: A Catalyst for Teaching and Learning in the Classroom. North Central Regional Educational Laboratory Critical Issue. Retrieved from http://www.ncrel.org/sdrs/areas/ issues/methods/technlgy/te600.htm. (Accessed on 26/07/2016)

Van Teijlingen E. and Hundley, V. (2001) "The importance of pilot studies", Social Research Update 35, Department of Sociology, University of Surrey

Vygotsky, L. (1978). Mind in society: The Development of Higher Psychological Processes. Cambridge: Harvard University Press

Vygotsky, L. (1986). Thought and Language. Cambridge: The MIT Pres.

Waddoups, G.L. (2004). Technology Integration, Curriculum, and Student Achievement: A Review of Scientifically Based Research and Implications for EasyTech. Portland, OR: Learning.com.

Weiner, R.S. (2000). Teachers Question Critical Study of Classroom Computers. New York Times, September 26, 2000.

Weizenbaum, J. (1976). Computer Power and Human Reason: From Judgment to Calculation. New York: W.H. Freeman and Company.

Welliver, E W. (2001). A code of professional ethics: A guide to professional conduct in the field of educational communications and technology. Bloomington, IN: Association for Educational Communications and Technology.

Wenger, E., White, N., Smith, J. D., & Rowe, K. (2005). Technology for communities. In Cefrio (Ed.), Communities of practice in 21st-century organizations.

WGDOL (2002). Distance Education and Open Learning in sub-Saharan Africa: A Literature Survey on Policy and Practice. Paris: Working Group on Distance Education and Open Learning of the Association for the Development of Education in Africa

WGDOL (2003). Technological Infrastructure and Use of ICT in Education in Africa: An Overview. Paris: Working Group on Distance Education and Open Learning of the Association for the Development of Education in Africa.

Whitehead, B.M., Jensen, D.F.N., & Boschee, F. (2003). Planning for Technology: A Guide for School Administrators, Technology Coordinators, and Curriculum Leaders. Thousand Oaks, CA: Corwin Press.

Wideen, M., Mayer-Smith, J., & Moon, B. (1998). A critical analysis of the research on learning to teach: making the case for an ecological perspective on inquiry. Review of Educational Research, 68(2), 130-178.

Winter, G. (2000). A comparative discussion of the notion of validity in qualitative and quantitative research. The Qualitative Report, 4(3&4). Available at http://www.nova.edu/ssss/QR/QR4-3/winter.html. (Accessed 20 May 2017)

Woodrow, J. E. (1992) “Locus of control and student teacher computer attitudes”, Computers in Education, Vol.14, No.5, pp. 421-432.

Woolgar, S. (1987). Reconstruction Man and Machine: A Note on Sociological Critiques of Cognitivism. Cambridge, MA: MIT press.

World Bank, World Development Report 2011: Conflict, Security, and Development (Washington D.C., 2011). See also Geneva Declaration (2011), Global Burden of Armed Violence, Cambridge University Press

Wright, C. (2001). Children and Technology: Issues, Challenges, and Opportunities. Childhood Education, 78, 37-41.

Yin, K. R., (1981): Case study research; design and methods, Applied Social Research Methods Series Volume 5

Yin, R.K. (1994), Case study research, Design and methods, second edition, Sage

Zhang, Y. (2005). A Collaborative Professional Development Model: Focusing on Universal Design for Technology Utilization. ERS Spectrum, summer 2005, 31-38.

Zlamanski, R., & Ciccarelli, M. (2012). Do Teachers Believe they are Competent to

Zucker, A. (2005). Starting School Laptop Programs: Lessons Learned. One-to-One Computing Evaluation Consortium Policy Brief, Number 1

12.0 Appendices

11.1 Appendix A- Interview Protocol for Educational technologist

1. What is the difference between education and learning?
2. How can you define the concept of 'technology'?
3. In your opinion, do you view technology as a 'process' or product?
4. What are educational technologies?
5. How useful do you find it using educational technologies in higher education?
6. What are if any, possible consequences in using educational technologies in higher education?
7. Have you done any research to ascertain the impact of educational technologies on student's performance?
8. What educational technologies are you familiar with?
9. What is the overall effect of using EduTech in the higher educational system?
10. What measure can aid the successful integration of educational technologies into learning and teaching deliveries in higher education?
11. Should teachers and students always employ technologies in their activities?
12. Will EduTech displace the teacher in the future?
13. What are the roles of the university leadership towards achieving effective integration of ICT in education?
14. How do you foresee the future of higher education in the 21st century era?

11.2 Appendix B- Interview Protocol for Lecturers

Section A: Demographic Information

1. Please identify your gender (tick one) a) Male……b) Female…….

2. Please tick the number that represents your age

20-30 years…….. 31-40 years…….

41-50 years…….. 51 years and above ……

3. What subject or course do you teach? ……..

4. What is your educational qualification? ……..

5. **How long have been teaching this course?** ……..

Section B: Educational Technology

7. What is the difference between education and learning?
8. In your opinion, do you view education as a 'process' or product?
9. How can you define the concept of 'technology'?
10. In your opinion, do you view technology as a 'process' or product?
11. What are educational technologies?
12. What educational technologies do you use regularly in your classroom activities?
13. Do you think the use of educational technologies increases student's performance?
14. Do you attend seminars, conferences or any training and development with respect to curriculum design?
15. What do you need to improve your chances of using educational technologies in the classroom?
16. Do you think adding interactive technologies in classroom curriculum would increase student's motivation, attitude, attendance and grade?
17. Have you conducted any research on the use of educational technologies in the classroom?
18. Do you think technology displace the teacher in the future?
19. How do you view the relationship between educational technologies and student's achievement?
20. How do you view the future of higher education in Ghana?

11.3 Appendix C- Questionnaire for Students

The purpose of this research is to explore the use of educational technologies (EduTech) in Ghanaian universities. This is an academic exercise and the confidentiality of the information provided by respondents would be strictly observed. Your participation will greatly help to achieve results.

SECTION A: DEMOGRAPHICS

1. **Gender** a) Male b) Female
2. **Age**
   a) 18-30 years b) 31-40 years
   b) 41-50 years c) 51 years and above
3. **Which university do you attend? …….**
4. **Program of study at the university.....**
5. **Level of study at the university**
   a) 1st year b) 2nd year c) 3rd year d) 4th year e) Other

SECTION B: AVAILABILITY OF EDUCATIONAL TECHNOLOGY

6. Definition of 'technology': Tick the statement below that best defines technology;
   a) The development and application of tools, machines, materials and processes that help in solving human problems
   b) The process by which human modify nature to meet their needs and wants
   c) The application of scientific principles to solve practical problems
   d) The information necessary to achieve a certain production outcome
7. In your opinion technology is a/an

   a) Process b) Product c) Product and process

8. Definition of 'Educational Technology': Tick the statement below that best defines ET;
   a) Any physical approach by which educational instructions are presented to school learners
   b) The theory and theory of design, development, utilization, management and evaluation of processes and resources for learning
   c) The application of tools, machines and materials that helps in teaching and learning
   d) The study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources for teaching and learning
9. Is there any educational technology available at the university?
   a) Yes b) No

10. If yes from (9) what educational technologies are available at your university?

…….

11. Are the available technologies in good condition for use?

a) Yes b) No

SECTION C: USE OF EDUCATIONAL TECHNOLOGY

12. Do you use any kind of educational technologies in learning?

a) Yes b) No

13. If Yes from (12) what educational technologies do you use in learning?

……..

14. How frequent do you use technologies in your learning activities?
    a. Never
    b. Seldom
    c. Occasionally
    d. All the time
15. I don't you use EduTech because

I lack the skill set to use ET	
Required ET are not available to use	
I do not need any kind of ET for my program of study	
ET makes learning difficult	

16. Is there any effective university leadership for the implementation of educational technology in the classroom teaching and learning in your university?

a) Yes b) No

17. Are there any training programs organized by the university to teach students on the use of educational technologies?

a) Yes b) No

18. How do you rate the importance of the following factors in influencing your use of EduTech?

Item	Not Important	Somewhat Important	Important	Very Important
Training, workshops and seminars				
Availability of resources				
Peer support				
Personal interest in ET				
University leadership				

SECTION D: EDUCATIONAL TECHNOLOGY AND LEARNING

19. What do you think are the benefits of using ET in learning?

……

20. I have a strong attitude in using ET in learning
    a) Strongly agree b) Neither agree or disagree c) Agree
    d) Disagree e) strongly disagree
21. Are there are any consequences of using ET in learning?
    a) Yes b. No
22. Do your tutors employ any educational technologies in their teaching?
    a) Yes b. No
23. How satisfied are you with your tutor's use of ET in teaching?
    a) Excellent b) Good c) Satisfied d) Poor
24. Overall, the use of ET by your tutors improved your learning process
    a) Strongly agree b) Neither agree or disagree c) Agree
    d) Disagree e) strongly disagree
25. Which of the following areas requires additional attention in education in the near future? (You can tick more than one)
    a) Excess technology in the classroom d) Training and Professional development
    b) Community involvement e) Student/Teacher attitude f) Digital literacy
    c) Classroom size g) university-industry relationship h) university leadership

11.4 Appendix D: Participant's Information sheet [Recruitment protocol]

The University of Salford

Salford Business School

Manchester, UK

Project Title: The Future of Higher Education: Exploring the Adoption of Educational Technologies for teaching and learning in Universities in Ghana.

Dear **[***Name of Participant***]**

My name is Nii Laryeafio Michael. I am a PhD student at the Salford Business School at the University of Salford UK, currently conducting research on the use of educational technologies in universities in Ghana. You are being invited to take part in a research study to examine how educational technologies will shape teaching and learning in universities in Ghana. The reason we have contacted you is because you are the target population whose perception about educational technologies will greatly help to achieve the study aim.

The data collection process consists of face-to-face formal interview and questionnaire administration. If you would like to participate or seek more information concerning this research project, please don't hesitate. If you have agreed to participate, I will explain informed consent information, the procedure for the interview/questionnaire and will make all the arrangement for it i.e. date, time and location. The researcher would strictly observe confidentiality of the information provided. Results of the data analysis may be published in journals or presented at academic conferences, but your name and identity would be completely anonymous. The consents form has been included as an attachment to this email. The interview will take approximately 25 minutes of you time.

I hope that you feel able to help with this study. If at any time you decide that you do not want to take part in the study, you are free to withdraw. Thank you in anticipation for your consideration.

Regards

Nii Laryeafio Michael

Email: m.niilaryeafio@edu.salford.ac.uk / m.niilaryeafio@gmail.com

University of Salford

Salford, Manchester

M5 4WT

11.5 Appendix E- Research Participant's Consent form

Title of Project: The Future of Higher Education: Exploring the adoption of Educational Technologies for teaching and learning in universities in Ghana.

Ethics Ref No: 140061

Name of Researcher: Nii Laryeafio Michael

Name of Research Supervisor: Dr Marie Griffiths

(Tick as appropriate)

➢ I confirm that I have read and understood the information sheet for the above study and what my contribution will be.	**Yes**	**No**	
➢ I have been given the opportunity to ask questions (face to face, via telephone and e-mail)	**Yes**	**No**	
➢ I agree to take part in the interview/questionnaire	**Yes**	**No**	**NA**
➢ I agree to the interview being tape recorded	**Yes**	**No**	**NA**
➢ I agree to digital images being taken during the research exercises	**Yes**	**No**	**NA**
➢ I understand that my participation is voluntary and that I can Withdraw from the research at any time **without giving any reason**	**Yes**	**No**	
➢ I understand how the researcher will use my responses, who will see them and how the data will be stored.	**Yes**	**No**	
➢ **I agree to take part in the above study**	**Yes**	**No**	

Name of Participants ……

Signature ……

Date ……

Researcher's email ……

11.6 Appendix F- Pilot Questions

	Pilot Questions
1	What is your gender? *
2	Please tick the number that represents your age *
3	Which university do you attend? *
4	Which program are you studying at the university? *
5	Which level are you on your program of study? *
6	How can you define the concept of Technology?
7	In your opinion, technology is a a) product b) process
8	What is Educational Technology?
9	Is there any Educational Technology available at your university?
10	If yes from (9) state the available technologies
11	Are the available technologies in good condition for use?
12	Do you use any kind of Educational technologies in classroom learning?
13	If yes from (12) state the kind of technologies you use in classroom learning
14	How frequent do you use technologies in your learning activities?
15	I do not use EduTech often because?
16	How do you rate the importance of the following factors in influencing your use of Educational technology
17	Is there any training programs organized by the university to support students with the use of educational technologies for your program of study?
18	What do you think are the benefits of using educational technologies
19	Do you think there are any consequences of using educational technologies in learning?
20	Do your tutors employ any educational technologies in their teaching deliveries?
21	Overall, has the use of ET by your tutors improved your learning processes?
22	What do you imagine the future of universities would look like?
	***Denotes Demographic Information of the Respondents**

11.7 Appendix G- Contents of an Educational Technology Plan.

- **I.** Executive summary/Introduction
- **II.** School's vision for educational technology
  - **a.** Why are we interested in using technology
  - **b.** How will technology impact teaching and learning in our school?
- **III.** Current status of educational technology in our school
- **IV.** Planning focus areas
  - **a.** Curriculum integration
    - **1.** Overview of our curriculum integration strategy
    - **2.** Goals and objectives
  - **b.** Staff development
    - **1.** Overview of our staff development
    - **2.** Goals and objectives
  - **c.** Community engagement
    - **1.** Overview of our community engagement strategy
    - **2.** Goals and objectives
  - **d.** Infrastructure
    - **1.** Overview of our infrastructure strategy
    - **2.** Goals and objectives
- **V.** Technology infrastructure design
- **VI.** Action plan year (for five years)
  - **a.** Curriculum integration
  - **b.** Staff development
  - **c.** Community engagement
  - **d.** Infrastructure
- **VII.** Roles and responsibilities
- **VIII.** Budget summary/funding strategies
- **IX.** Evaluation
- **X.** Appendices- committee membership, inventories, survey data, glossary, bibliography

Sources: Adapted from Sun *et al*., 2000

11.8 Appendix H: Interviewee-researcher images

Appendix C: Research Consent form

Title of Project: Educational technologies

Name of Researcher: Nii Laryeafio Michael

(Delete as appropriate)

➢ I confirm that I have read and understood the information sheet for the above study (version x- date) and what my contribution will be.	Yes	~~No~~
➢ I have been given the opportunity to ask questions (face to face, via telephone and e-mail)	Yes	~~No~~
➢ I agree to take part in the interview/questionnaire	Yes	~~No~~ ~~NA~~
➢ I agree to the interview being tape recorded	Yes	~~No~~ ~~NA~~
➢ I agree to digital images being taken during the research exercises	Yes	~~No~~ ~~NA~~
➢ I understand that my participation is voluntary and that I can withdraw from the research at any time **without giving any reason**	Yes	~~No~~
➢ I understand how the researcher will use my responses, who will see them and how the data will be stored.	Yes	~~No~~
➢ **I agree to take part in the above study**	Yes	No

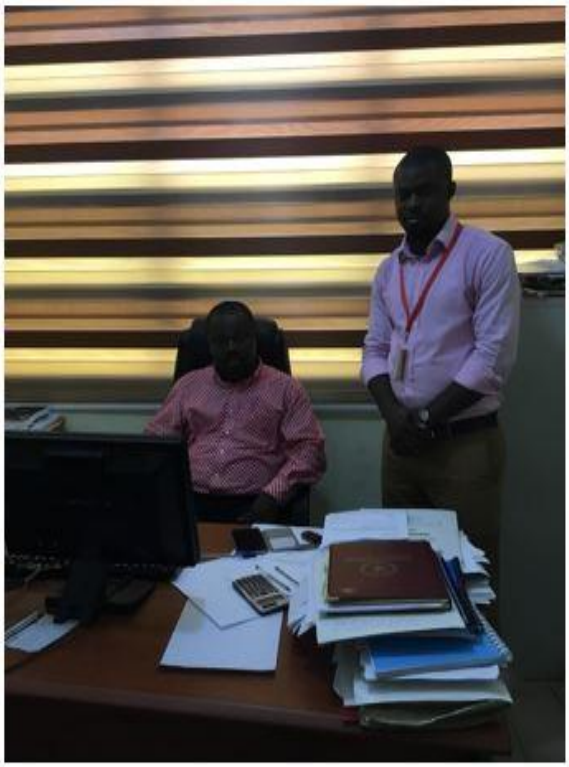
Name of participant [illegible]

Signature [signature]

Date 9/12/18

Name of researcher taking consent Nii Laryeafio Michael

Researcher's e-mail address N.Nii-Laryeafio@edu.salford.ac.uk



Appendix C: Research Consent form

Title of Project: Educational technologies

Name of Researcher: Nii Laryeafio Michael

~~Tick~~ (Delete as appropriate)

➢ I confirm that I have read and understood the information sheet for the above study (version x- date) and what my contribution will be.	Yes ✓	No	
➢ I have been given the opportunity to ask questions (face to face, via telephone and e-mail)	Yes ✓	No	
➢ I agree to take part in the interview/questionnaire	Yes ✓	No	NA
➢ I agree to the interview being tape recorded	Yes ✓	No	NA
➢ I agree to digital images being taken during the research exercises	Yes ✓	No	NA
➢ I understand that my participation is voluntary and that I can withdraw from the research at any time **without giving any reason**	Yes ✓	No	
➢ I understand how the researcher will use my responses, who will see them and how the data will be stored.	Yes ✓	No	
➢ **I agree to take part in the above study**	Yes ✓	No	

Name of participant [illegible]

Signature [signature]

Date 25/10/16

Name of researcher taking consent Nii Laryeafio Michael

Researcher's e-mail address N.Nii-Laryeafio@edu.salford.ac.uk

Appendix C: Research Consent form

Title of Project: Educational technologies

Name of Researcher: Nii Laryeafio Michael

(Delete as appropriate)

➢ I confirm that I have read and understood the information sheet for the above study (version x- date) and what my contribution will be.	Yes	No
➢ I have been given the opportunity to ask questions (face to face, via telephone and e-mail)	Yes	No
➢ I agree to take part in the interview/questionnaire	Yes	No NA
➢ I agree to the interview being tape recorded	Yes	No NA
➢ I agree to digital images being taken during the research exercises	Yes	No NA
➢ I understand that my participation is voluntary and that I can withdraw from the research at any time **without giving any reason**	Yes	No
➢ I understand how the researcher will use my responses, who will see them and how the data will be stored.	Yes	No
➢ **I agree to take part in the above study**	Yes	No

Name of participant Dr. S. A. Azinge

Signature

Date 25-10-2016

Name of researcher taking consent Nii Laryeafio Michael

Researcher's e-mail address N.M.Laryeafio@edu.salford.ac.uk

Appendix C: Research Consent form

Title of Project: Educational technologies

Name of Researcher: Nii Laryeafio Michael

(Delete as appropriate)

➢ I confirm that I have read and understood the information sheet for the above study (version x- date) and what my contribution will be.	Yes	No
➢ I have been given the opportunity to ask questions (face to face, via telephone and e-mail)	Yes	No
➢ I agree to take part in the interview/questionnaire	Yes	No NA
➢ I agree to the interview being tape recorded	Yes	No NA
➢ I agree to digital images being taken during the research exercises	Yes	No NA
➢ I understand that my participation is voluntary and that I can withdraw from the research at any time **without giving any reason**	Yes	No
➢ I understand how the researcher will use my responses, who will see them and how the data will be stored.	Yes	No
➢ **I agree to take part in the above study**	Yes	No

Name of participant Dr. Henry Kofi Menyah

Signature

Date 25/10/2016

Name of researcher taking consent Nii Laryeafio Michael

Researcher's e-mail address N.M.Laryeafio@edu.salford.ac.uk

Appendix C: Research Consent form

Title of Project: Educational technologies

Name of Researcher: Nii Laryeaflo Michael

Tick as appropriate)

➢ I confirm that I have read and understood the information sheet for the above study (version x- date) and what my contribution will be.	✓ Yes	No	
➢ I have been given the opportunity to ask questions (face to face, via telephone and e-mail)	✓ Yes	No	
➢ I agree to take part in the interview/questionnaire	✓ Yes	No	NA
➢ I agree to the interview being tape recorded	✓ Yes	No	NA
➢ I agree to digital images being taken during the research exercises	✓ Yes	No	NA
➢ I understand that my participation is voluntary and that I can withdraw from the research at any time **without giving any reason**	✓ Yes	No	
➢ I understand how the researcher will use my responses, who will see them and how the data will be stored.	✓ Yes	No	
➢ **I agree to take part in the above study**	✓ Yes	No	

Name of participant: Dr. Lord Mensah

Signature:

Date: 21/10/2016

Name of researcher taking consent: Nii Laryeaflo Michael

Researcher's e-mail address: N.Nii-Laryeaflo@edu.salford.ac.uk

Appendix C: Research Consent form

Title of Project: Educational technologies

Name of Researcher: Nii Laryeaflo Michael

Tick as appropriate)

➢ I confirm that I have read and understood the information sheet for the above study (version x- date) and what my contribution will be.	✓ Yes	No	
➢ I have been given the opportunity to ask questions (face to face, via telephone and e-mail)	✓ Yes	No	
➢ I agree to take part in the interview/questionnaire	✓ Yes	No	NA
➢ I agree to the interview being tape recorded	✓ Yes	No	NA
➢ I agree to digital images being taken during the research exercises	✓ Yes	No	NA
➢ I understand that my participation is voluntary and that I can withdraw from the research at any time **without giving any reason**	✓ Yes	No	
➢ I understand how the researcher will use my responses, who will see them and how the data will be stored.	✓ Yes	No	
➢ **I agree to take part in the above study**	✓ Yes	No	

Name of participant: MICHAEL INSAIDOO

Signature:

Date: 20/10/2016

Name of researcher taking consent: Nii Laryeaflo Michael

Researcher's e-mail address: N.Nii-Laryeaflo@edu.salford.ac.uk

Research Participant's Consent form

Title of Project: The Future of Higher Education: Exploring the use of Educational Technologies in universities in Ghana.

Ethics Ref No: 140061

Name of Researcher: Nii Laryeafio Michael

Name of Research Supervisor: Dr Marie Griffiths

(Tick as appropriate)

➢ I confirm that I have read and understood the information sheet for the above study and what my contribution will be.	✓ Yes	No	
➢ I have been given the opportunity to ask questions (face to face, via telephone and e-mail)	✓ Yes	No	
➢ I agree to take part in the interview/questionnaire	✓ Yes	No	NA
➢ I agree to the interview being tape recorded	✓ Yes	No	NA
➢ I agree to digital images being taken during the research exercises	✓ Yes	No	NA
➢ I understand that my participation is voluntary and that I can Withdraw from the research at any time **without giving any reason**	✓ Yes	No	
➢ I understand how the researcher will use my responses, who will see them and how the data will be stored.	✓ Yes	No	
➢ **I agree to take part in the above study**	✓ Yes	No	

Name of Participants PETE WHITTON

Signature [signature]

Date 4/11/17

Researcher's email p.whitton@mmu.ac.uk

M.nilaryeafio@edas.ed.ac.uk

11.9 Appendix I: UKAIS 2015 Conference Attendance, UK

11.10 Appendix J: Letter of Introduction/Cover Letter

University of Salford MANCHESTER

Salford Business School
University of Salford
Maxwell Building
The Crescent
Salford
M5 4WT

Date: October 2016

Nii Laryeafio Michael

ID Number: @00371554

Dear Sir or Madam

This is a letter of introduction for **Nii Laryeafio Michael**, who is a PhD student at the University of Salford. I am Nii Laryeafio's PhD supervisor and he is conducting research into the future of higher education in Ghana and the adoption of Educational technology. He hopes to administer questionnaire to students and talk to, educators and observe teaching and learning practices at a number of universities in Ghana and would be very grateful if you permit him to include your university as part of his study.

The research study has gone through an academic ethics procedure within our university and we have ensured that all procedures have been thought through to ensure that the research will be ethically conducted.

We would be very grateful if you consent for **Nii Laryeafio** to conduct his research in your university in Ghana and he would share his findings with you.

If you need any further information or details of the study please do not hesitate to contact me
Kind regards,

Marie Griffiths

Dr Marie Griffiths

Programme Director

Reader, Salford Business School

Room 604, Maxwell Building, University of Salford, Salford, Manchester, M5 4WT, UK

Tel. ++ 44 (0)161 295 4237

11.11 Appendix K: Summary of Specific Literature Used (Indicative References)

British Journal of Educational Technology

1. **Zrnec, A. and Lavbic, D**. **(2017).** '*Social network aided plagiarism detection'*. Vol 48 No 1
2. **Wheeler, S., Yeomans, P. and Wheeler, D. (2008).** 'The good, the bad and the wiki: Evaluating student-generated content for collaborative learning'. *Vol 39 No 6*
3. **Hobbs, R. and Tuzel, S. (2017).** *'Teacher motivations for digital and media literacy: An Examination of Turkish educators*'. Vol 48 No 1
4. **Pavlo, D. A., Dawson, K. and Sahay, S. (2017).** '*A framework for aligning needs, abilities and affordances to inform design and practice of educational technologies*'. Vol 48 No 4
5. **Tugba, H., Ozturk and Hodgson, V. (2017).** '*Developing a model of conflict in virtual learning communities in the context of a democratic pedagogy'*. Vol 48 No 1
6. **Yanyan, S.**, **Franklin, T. and Gao, F. (2017).** '*Learning outside of classroom: Exploring the active part of an informal online English learning community in China'*. Vol 48 No 1
7. **Mercier, E., Vourloumi, G., and Higgins, S. (2017).** *'Student interactions and the development of ideas in multi-touch and paper-based collaborative mathematical problem solving*'. Vol 48 No 1
8. **Cho, H., Y. and Kenneth, Y. T. L. (2017).** 'Effectiveness of collaborative learning with 3D virtual worlds' Vol 48 No 1
9. **Pargman, C., T., Nouri, J. and Marcelo, M. (2018).** '*Taking an instrumental genesis lens: New insights into collaborative mobile learning'*. Vol 49 No 2
10. **Sun, Z., Chin-His, L., Minhua, W., Jianshe, Z. and Luo, L. (2018***). 'A tale of two communication tools: Discussion-forum and mobile instant-messaging apps in collaborative learning'***.** Vol 49 No 2
11. **Northey, G., Govind, R., Bucic, T., Chylinski, M., Doland, R., and Patrick, V. E. (2018).** '*The effect of 'here and now' learning on student engagement and academic achievement'*. Vol 49 No 2
12. **Sorgo, A., Bartol, T., Danica, D., and Bojana, B. P. (2017).** '*Attributes of digital natives as predicators of information literacy in higher education'*. Vol 48 No 3

13. **Stratling, R.** (2017). *'The complementary use of audience response systems and online tests to implement repeat testing: A case study*.' Vol 46 No 2
14. **Allison, L. and Hood, N. (2017).** '*How educators build knowledge and expand their practice: The case of open education resources'*. Vol 48 No 2
15. **Zhao, H.**, **and Sullivan, P. H. K. (2017).** '*Teaching presence in computer conferencing learning environments: Effects on interactions, cognition and learning uptake'*. Vol 48 No 2
16. **Benneth, S., Dawson, P., Bearman, M., Molloy, E., and Boud, D. (2017).** *'How technology shapes assessment design: Findings from a study of university of teachers'.* Vol 48 No 2

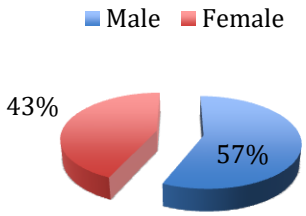
Books on educational Technology and Pedagogical practices

1. **Sharpe, R., Beetham, H. and De Freitas, S. (2010). '***Rethinking Learning for a digital age: How learners are shaping their own Experiences'***.** Routledge**.**
2. **Laurillard, D. (2010).** *'Teaching as a Design Science: Building Pedagogical Patterns for Learning and Technology'***.** Routledge
3. **Beetham, H., and Sharpe, R. (2007).** *'Rethinking pedagogy for a digital age: Designing and delivering e-learning***'.** Routledge.
4. **Selwyn, N. (2016). 'Is** *Technology Good for Education?***'.** Polity Press
5. **Selwyn, N. (2014).** *'Digital Technology and the Contemporary University: Degrees of Digitalization'.* Routledge
6. **Selwyn, N. (2014).** *'Distrusting Educational Technology: Critical Questions for changing times***'.** Routledge
7. **Selwyn, N. (2014). '***Education and Technology: Key Issues and Debates'***.** Routledge
8. **Lea, J. (2015). '***Enhancing Learning and teaching in Higher Education: Engaging with the Dimensions of Practice'***.** McGraw Hill
9. **Ferster, B. (2014).** *'Teaching Machines: Learning from the Intersection of Education and Technology'***. Johns Hopkins**
10. **Seels, B. B. and Richey, C. R. (1994).** *'Instructional Technology: The Definition and Domains of the field'***.** AAH Graphics

11. **Rempel, P. S. (2015). '***Instructional technology roles and competencies: Preparing for the 21st Century'***.** LAP
12. **Selwyn, N. (2013).** *'Education in a Digital World: Global Perspectives on Technology and Education'***.** Routledge
13. **Oliver, M. and Conole, G. (2007). '***Contemporary perspectives in E-Learning Research: themes, methods and impact on practice'***.** Routledge

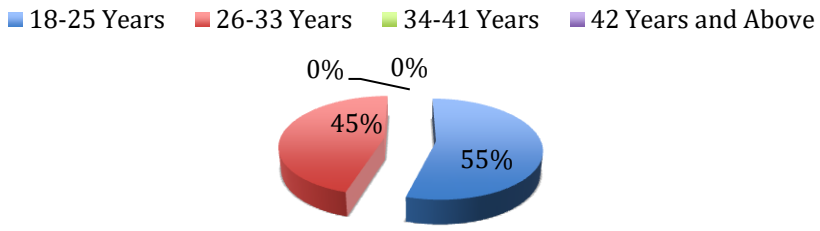
11.12 Appendix L: List of Figures for UG

Figure 7.1a: Gender of UG student



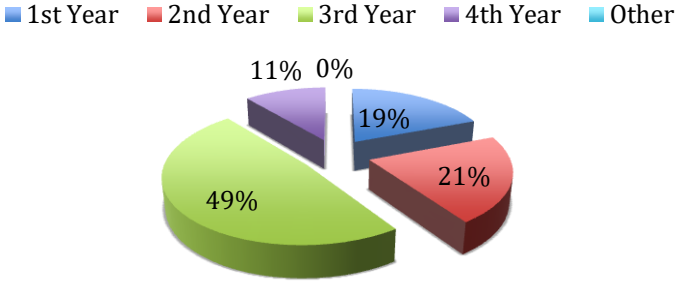
Source: Field survey, 2016

Figure 7.2a: Age Distribution



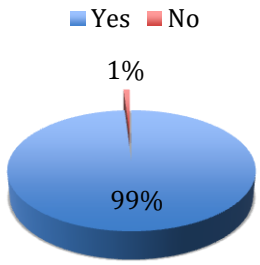
Source: Field survey, 2016

Figure 7.3a: Level of Study



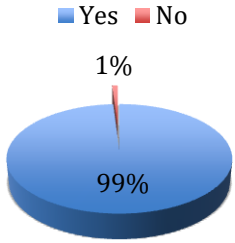
Source: Field survey, 2016

Figure 7.5a: Availability of EduTech at UG



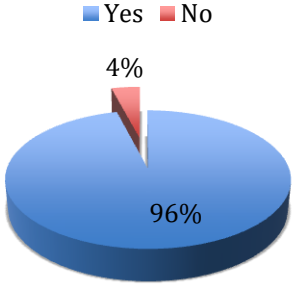
Source: Field survey, 2016

Figure 7.6a: Condition of available EduTech at UG



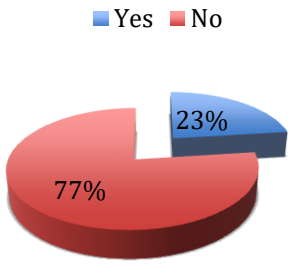
Source: Field survey, 2016

Figure 7.7a: Usage of EduTech by UG students



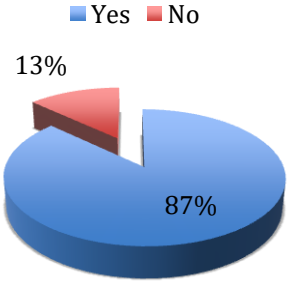
Source: Field survey, 2016

Figure 7.13a: Consequences in using EduTech



Source: Field survey, 2016

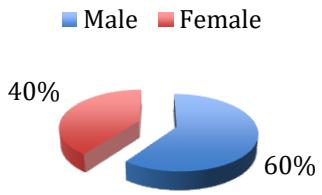
Figure 7.14a: Tutor's use of EduTech



Source: Field survey, 2016

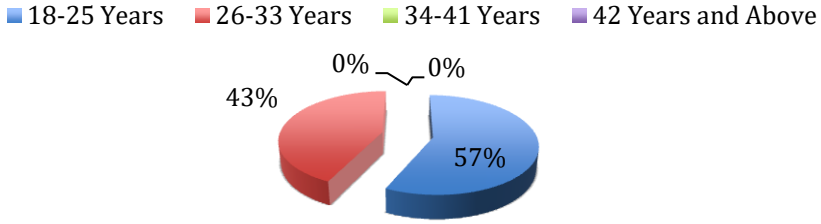
11.13 Appendix M: List of Figures for UCC

Figure 7.1b: Gender



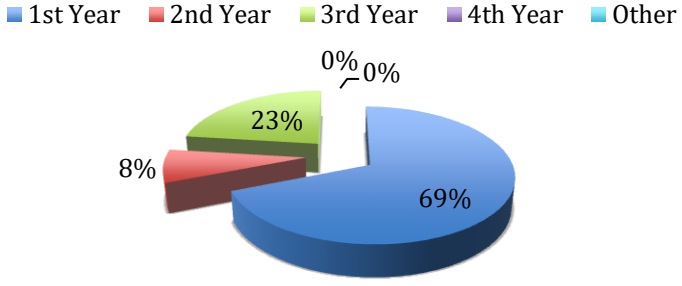
Source: Field survey, 2016

Figure 7.2b: Age distribution of UCC students



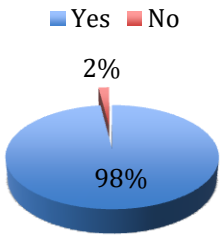
Source: Field survey, 2016

Figure 7.3b: Level of study for UCC students



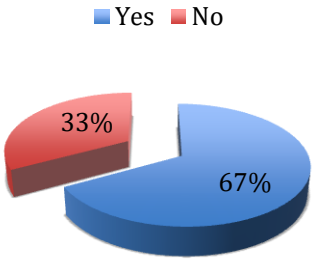
Source: Field survey, 2016

Figure 7.5b: Availability of EduTech



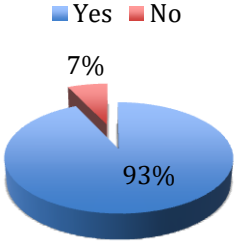
Source: Field survey, 2016

Figure 7.6b: Condition of Service



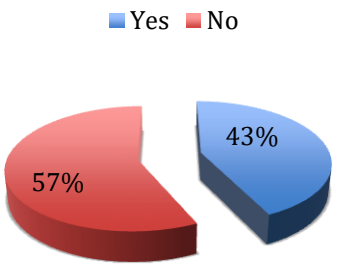
Source: Field survey, 2016

Figure 7.7b: Use of EduTech in Learning



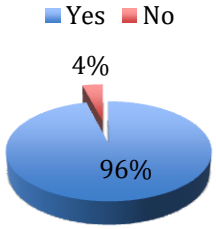
Source: Field survey, 2016

Figure 7.13b: Consequences of using EduTech



Source: Field survey, 2016

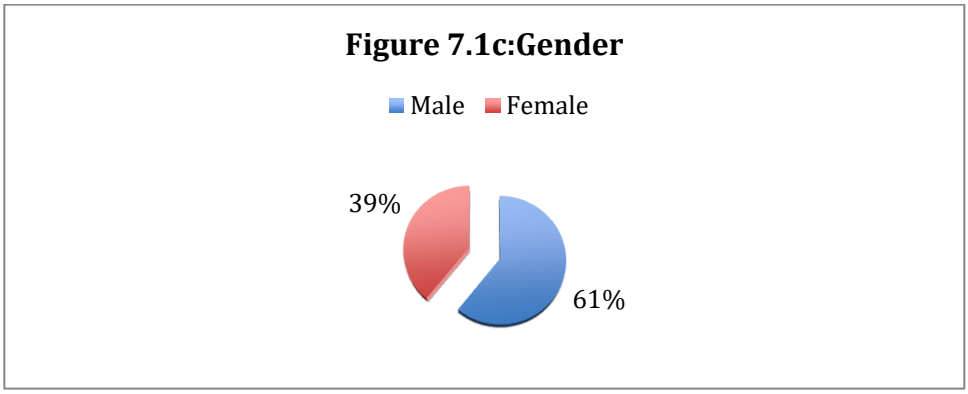
Figure 7.14b: Tutor's use of EduTech



Source: Field survey, 2016

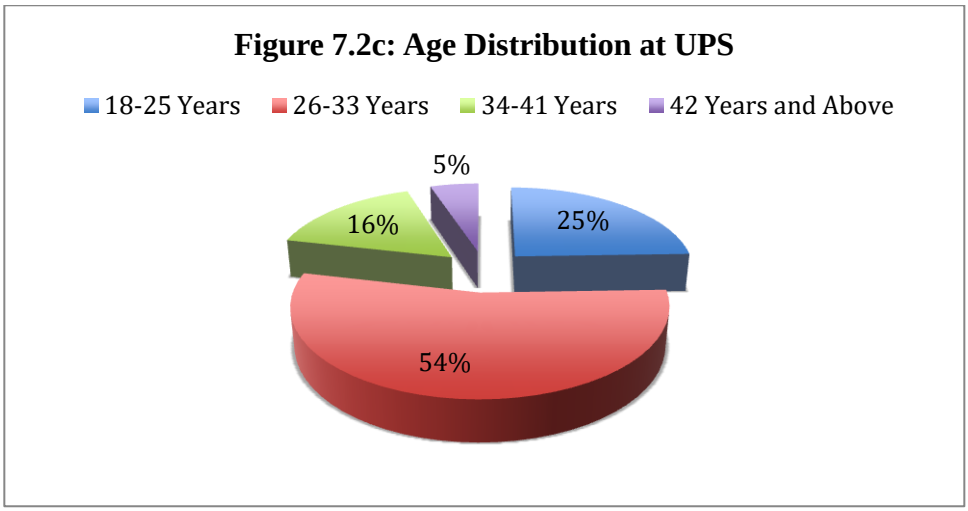
11.14 Appendix N: List of Figures for UPSA

Figure 7.1c:Gender



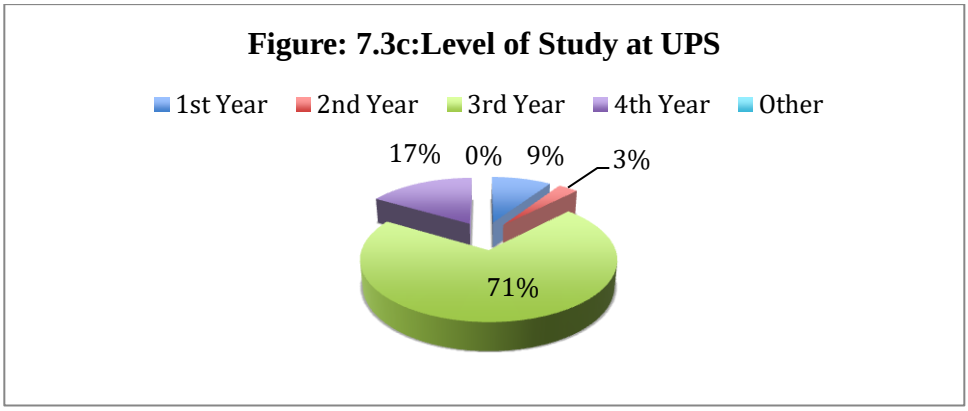
Source: Field Survey, 2016

Figure 7.2c: Age Distribution at UPS



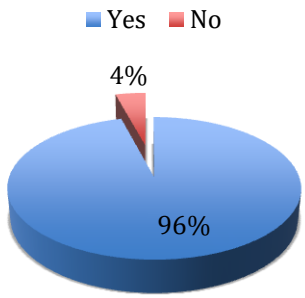
Source: Field Survey, 2016

Figure: 7.3c:Level of Study at UPS



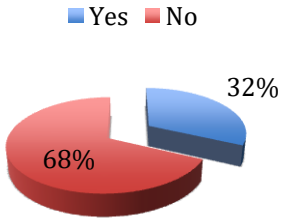
Source: Field Survey, 2016

Figure 7.5c: Availability of EduTech at UPS



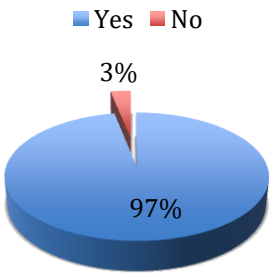
Source: Field Survey, 2016

Figure 7.6c :Condition of available EduTech at UPS



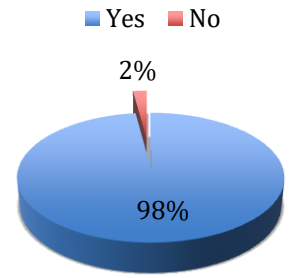
Source: Field survey, 2016

Figure 7.12c: Consequences of EduTech



Source: Field survey, 2016

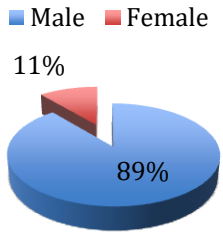
Figure 7.13c: Tutor's use of EduTech



Source: Field survey, 2016

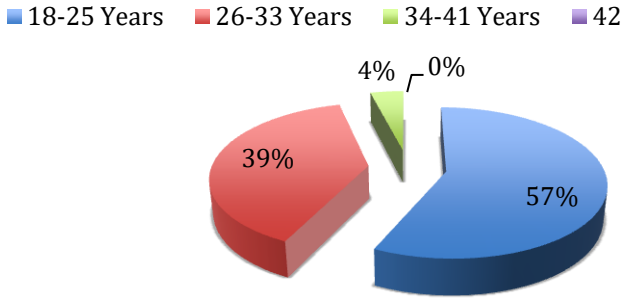
11.15 Appendix O: List of Figures for KNUST

Figure7.1d: Gender of respondents



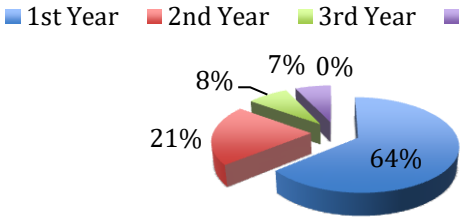
Source: Field survey, 2016

Figure 7.2d: Age distribution of respondents



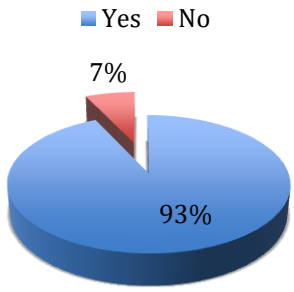
Source: Field survey, 2016

Figure 7.3d: Level of study



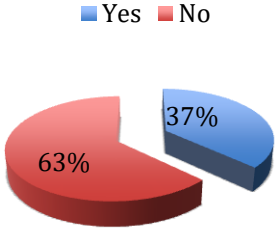
Source: Field survey, 2016

Figure 7.5d: Availability of EduTech at KNUST



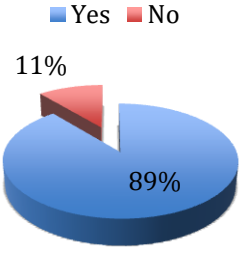
Source: Field survey, 2016

Figure 7.6d: Condition of Available EduTech at KNUST



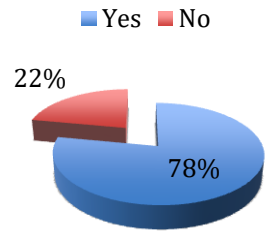
Source: Field survey, 2016

Figure 7.7d: Student's use of EduTech



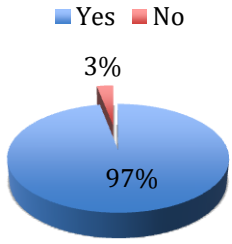
Source: Field survey, 2016

Figure 7.13d: Consequences in EduTech



Source: Field survey, 2016

Figure 7.14d : Tutor's use of EduTech



Source: Field survey, 2016